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TROPICAL DISEASES BULLETIN

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BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

Vol. 52] 1955 [No. 9

SUMMARY OF RECENT ABSTRACTS *

VII. HELMINTHIASIS †

(Continued from p. 735)

NEMATODES

Anthelmintics

DESCHIENS (p. 946) describes his method for estimating the anthelmintic action of drugs by injecting them through the anus of mice infected with various worms. He has used the method for a number of substances, which he lists.

Tetrachlorethylene has been used as an anthelmintic in vast numbers of patients, and there have been few reports of toxicity. A fatality is reported by GOLDBLOOM and BOYD (p. 816), however, in which the drug was inadvertently given to a patient with infective hepatitis. They conclude that it must not be given to patients with damaged livers. Phenothiazine is much used, and its dangers have been pointed out many times. Preparations in which the drug is incorporated in chocolate have been marketed, and because they are therefore attractive, they have been taken in excessive doses by children. KÖTTGEN and KUSCHINSKY (p. 624), and BOGNER (p. 964) report cases of poisoning in this way; such preparations should be forbidden.

Papain is a proteolytic ferment which *in vitro* exerts a digestive action on the cuticle of worms such as *Ascaris*, and destroys them in a relatively short time (MENDHEIM *et al.*, p. 419; APARICIO GARRIDO and PRIETO LORENZO, p. 1169). A preparation known as Vermizym (Schwab) has been used by BARRERA MONCADA (p. 1275) for intestinal helminthiasis, by CAPOCACCIA *et al.* (p. 198) for *Ascaris*, and by CAPOCACCIA and MASTRANDREA (p. 624) for *Enterobius*; it is well tolerated and fairly effective. Another preparation, Velardon, may be effective against *Ascaris* in a single treatment (JONXIS and BEKIUS, p. 79), and enteric-coated capsules of papain have been successful against *Trichuris* (MACCARTHY, p. 623).

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1954, v. 51. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

† For previous articles on helminthiasis in this series see the August and September issues of the *Tropical Diseases Bulletin* each year since 1939.

Hookworm Infection, etc.

In an area of the Black Sea coast of Turkey hookworm infection affects from 0·3 to 53 per cent. of the people. Özsan (p. 294) attributes this high rate partly to the use of human faeces as fertilizer.

Weinstein (p. 501) has cultivated the free-living stages of *Ancylostoma caninum* and *A. duodenale* in fresh chick-embryo or rat-liver extracts free from viable bacteria. He gives details of the procedures. Experiments with *Ancylostoma caninum* indicate that hookworm larvae do not migrate appreciably on the surface of the soil, and that spread can take place only if they are carried by water (Harada, p. 1078).

Trincão *et al.* (pp. 77, 78) have investigated the blood levels of iron, copper and zinc, and the changes in blood proteins, in hookworm infection. In discussing the pathogenesis of hookworm anaemia Piazza (p. 501) contends that the infection has a toxic effect on the blood-forming organs, and that liver extract can cure the anaemia which is due to the worms only after they have been eliminated. There are, of course, other contributory factors in the aetiology of hookworm anaemia, for instance the bleeding caused by the parasite. By injecting intravenously red cells labelled with radio-active iron in patients with hookworm infection, and measuring the rate of appearance of radio-active iron in the faeces before and after treatment with anthelmintics, Gerritsen *et al.* (p. 1078) failed to find any correlation between worm load and blood loss.

In studies of hookworm infection in Indo-China Brumpt and Ho Thi Sang (p. 295) observed that in anaemic patients it was difficult for the worms to mature, and therefore to produce eggs, but that when the patients responded to anti-anaemic treatment the process of maturation was facilitated. They found that anthelmintic treatment was easier in anaemic patients in that the worms were more easily removed, and they think that anthelmintic treatment should not usually be postponed until after the anaemia has been corrected. They recommend careful use of tetrachlorethylene, 3–5 gm. In northern Persia hookworm infection is quite common, but Kajahn (p. 417) found anaemia in only half the patients, and most severely in children and women of child-bearing age. She thinks that the anaemia must be treated before the worms are removed [but see Brumpt and Ho Thi Sang, above]. In workers in a jute mill near Calcutta hookworm infection did not appear to influence significantly the haemoglobin level of males, but did so to some extent in the most heavily infected females (Chernin, p. 828). Other causes of anaemia—malnourishment, overwork and chronic disease—remain important. In a discussion of hookworm disease in Somaliland Lipparoni (p. 615) remarks that evidence of ariboflavinosis is common, and notes that elimination of the infection does not necessarily cure the anaemia, which may require iron, arsenic, liver and vitamins.

Elmes and McAdam (p. 815) record a number of cases of abdominal surgical complications of infection with *Oesophagostomum* and hookworms.

Noda (p. 815) describes an intradermal test with a polysaccharide prepared from hookworm larvae, which apparently gives a positive reaction in most infected persons, regardless of the weight of infection. It tends to remain positive for a year or more after anthelmintic treatment.

In Siam Sadun and his colleagues (pp. 706, 1274) have treated hookworm infection with an extract of the berries of a local hardwood tree, known as maklua. The results seemed to be encouraging, but they should be treated with caution, as only limited work has so far been done. They have instituted a treatment and sanitation campaign for the control of hookworm infection, with some indication of improvement.

In parts of Iraq where there is high humidity with abundant shade and grass or other carpet vegetation, WATSON (p. 78) found a very high incidence of infection with *Trichostrongylus* (25·4 per cent. in Basra). The infection is common in sheep and is probably contracted by man through the consumption of contaminated greenstuffs.

Experiments with *Nippostrongylus muris* suggest that antibodies produced by the host against enzymes in the secretions and excretions of the worms would react against the enzymes of invading larvae, to slow down their movement, and would interfere with their nutrition. This would allow the reticulo-endothelial system of the host to attack and encapsulate the larvae (THORSON, p. 418).

HARTZ (p. 956) reports two cases of *Strongyloides* infection in children; both died and in both there was evidence of auto-infection. He suggests that in all cases of auto-infection reported the patient has been debilitated, and that auto-infection of persons in good health has not been proved. In comment Napier quotes ex-prisoners-of-war from the Far East who, 9 years after the last opportunity for re-infection, still have a heavy infection quite undiminished by time and treatment, which seems to indicate that auto-infection can occur in healthy persons.

The Thorn test with corticotrophin was negative in several puppies infected with *Strongyloides stercoralis* but was positive in cured animals (GALLIARD and BERDONNEAU, p. 418). Cortisone apparently enhanced the infection.

Ascaris infection

In parts of Belgrade infection with *Enterobius*, *Trichuris* and *Ascaris* is common, and KOSTIĆ *et al.* (p. 419) have found that the sewage contains several thousand *Ascaris* eggs per litre, and that one swimming bath contained 46 per litre. Manuring of fields with raw sewage is standard practice.

The very high incidence rate of 56 per cent. is recorded for *Ascaris* infection in the lake zone of Chile by SILVA *et al.* (p. 1274), but in the north the incidence is low (1–7 per cent.) possibly because the climatic conditions are unfavourable (NEGHME *et al.*, p. 1275).

In a study of the hatching of *Ascaris* eggs in the alimentary tract of mice, TAKAHASHI (p. 817) found that mature eggs hatch in the small intestine, and may do so without any action of gastric juice.

GERMANS (p. 616) tested the resistance of *Ascaris* eggs to various physical factors and to chemical poisons. Of the poisons only phenol and carbon disulphide were lethal in a short time, but the eggs were susceptible to drying and high temperatures.

A discussion of the relationship of *Ascaris* infection to various skin conditions is contributed by STAUFFER (p. 198). JELLIFFE (p. 707) discusses *Ascaris* infection in relation to malnutrition in tropical children, quoting the case of a child aged 4 years, who passed 120 adult *Ascaris* after treatment. These, no doubt, deflected a considerable part of his protein intake. Transient infiltration of the lungs and eosinophilia, due to *Ascaris* infection, is reported by EBERT (p. 1179) in several members of one family. The infection was attributed to contaminated strawberries.

MATSUNO (p. 958) reports histological changes in a high proportion of livers of persons in whom operations were performed on the bile ducts and in whom *Ascaris* invasion of those ducts was found. These changes were seen in portions of the liver which are macroscopically normal.

A sugar flotation method for *Ascaris* eggs in faeces is described by KIMURA and OHKUBO (p. 818). Details are given in the original abstract.

Diethylcarbamazine has been used by several workers in *Ascaris* and

hookworm infections, the general impression being that it is useful against *Ascaris* but less so against hookworm. Ghanem (p. 617) gave courses of 10 mgm. per kgm. daily (divided into 3 doses) for 3 days, repeated if necessary for up to 5 courses; or 25 mgm. per kgm. daily for 3 days, repeated for up to 3 courses. He thinks that it is not the most effective drug in *Ascaris* infections, however, partly because the treatment is so lengthy. Brumpt and Ho Thi Sang (p. 1179) regard its action as direct and vermifugal on *Ascaris*, rather than vermicidal, but on hookworms it acts through its presence in the blood stream. It is not satisfactory for *Trichuris*. Blum-Gayet (p. 1273) uses it for *Ascaris* but prefers hexylresorcinol for hookworm, and for *Ascaris* Kurian (p. 502) prefers oil of chenopodium.

Treatment with erythromycin has been followed by abundant expulsion of *Ascaris* (Torrealba *et al.*, p. 681).

Jungalwalla (p. 616) gives an account of ascariasis in children in a Bombay hospital, and remarks that the most important measure in prevention is education.

Filarial infections

Chabaud and Choquet (p. 420) have attempted to classify the filarial worms, accepting 89 valid genera. Details must be sought in the original.

Deschiens and Pfister (p. 1279) have observed, in two patients in the Upper Volta, a microfilaria which could not be identified with any of the known species, and which they have provisionally named *Microfilaria soudanica* n. sp.

A histological study of enlarged lymphatic glands in relation to filariasis is reported by Rodhain (p. 960) who has examined material from the Belgian Congo, which originated from areas where *Onchocerca volvulus* and *Wuchereria bancrofti* were present either alone or together. The adenolymphoceles were of 3 types. One showed dilatation of lymph vessels and was soft; it seemed to be associated with *W. bancrofti*. The second was firm, with sclerosis, and was probably allergic. The third comprised hard, sclerosed masses, with much connective tissue, and was found where *O. volvulus* was prevalent. The account of these should be read in full.

Wuchereria bancrofti:—

The Filariasis Research Unit, Tanganyika, in its reports for 1952 and 1953 (pp. 819, 1180) makes several interesting points. The use of filarial antigens for skin tests has proved disappointing. Diethylcarbamazine may be useful in preventing the development of hydrocele and elephantiasis, though this can only be determined after long observation. It is valuable in relieving symptoms even in cases of elephantiasis. The glucamine antimoniate preparation Protostib, and arsenamide, probably have no effect which could not be achieved equally well and more safely with diethylcarbamazine. The two important vectors on an island in Lake Victoria are *Anopheles gambiae* and *A. funestus*; culicines are probably unimportant. For onchocerciasis Neostibosan was used, but in most cases the skin continued to contain live microfilariae, though skin and eyes appeared to become desensitized.

In Tanganyika Jordan (p. 199) made a filariasis survey of the Southern Highlands Province, where two foci of *W. bancrofti* infection exist, but the rest is free. He (p. 820) has observed that microfilariae of *W. bancrofti* are more commonly found in hospital patients suffering from tropical ulcer or traumatic diseases than in febrile patients. He discusses the implications of this observation, which are not yet clear, but may involve some action by the products of tissue damage.

In Mauritius microfilariae of *W. bancrofti* were found by Huehns (p. 296) in 11 per cent. of the civilians examined. Periodicity was nocturnal and the vectors were *Culex fatigans*, *Anopheles gambiae* and *A. maculipalpis*. The infection is benign and elephantiasis is infrequent.

Microfilariae of *W. bancrofti* are commonly found in Belém, Brazil, where a survey by Deane and Damasceno (p. 80) showed a general incidence of 9·8 per cent., lower in white persons and higher in Negroes. *Culex fatigans* is very prevalent. On the other hand, Deane *et al.* (p. 80) found only a low rate in Macció, Alagoas, which had previously had a bad reputation.

In Recife de Azevedo and Dobbin (p. 81) found the infection in 9·7 per cent. of a group of people.

Although they have observed great differences in the microfilaria counts in 3 samples of 20 cmm. of blood taken at the same time from the finger, Rachou *et al.* (p. 1277) think that for surveys, samples of 20 cmm. are satisfactory.

Noting that as a rule in young children there is no blood infection with *W. bancrofti*, and recalling earlier work which indicated that certain anophelines feed less on young children than on older children and adults, Muirhead-Thomson (p. 1080) speculates on the possibility that the low rates are a reflection of similar selective biting.

In Ceylon *C. fatigans*, the vector of *W. bancrofti*, breeds prolifically in pits in which coconut husks are soaked. Dassanayake (p. 1278) states that this breeding can be avoided if the pits are constructed so as to be in moving water on the margins of rivers or close to the sea. Krishnaswami and Raghavan (p. 1080) review work done on the vectors of *W. bancrofti* and *W. malayi* in India.

McFadzean and Hawking (p. 708) used the trivalent arsenical Arsenamide in *W. bancrofti* infection, giving 1·8–2·5 mgm./kgm. daily for 10–12 days by intravenous injection. Results indicated that the adult worms were killed or sterilized and that many microfilariae were killed; but there is a toxic effect on the liver. There is evidence that the minimum curative dose may be about 0·6 mgm./kgm. The drug is also active against *D. perstans*.

In part of Ceylon legal provision is made to compel persons with microfilariae in the blood to undergo treatment with diethylcarbamazine. Dassanayake (p. 1181) reports the results of a course of treatment in a group of people—in whom the microfilaria rate was much reduced—and of a larvicidal campaign against the vectors.

In Paramaribo, Surinam, *W. bancrofti* infection is widespread, the vector being *Culex fatigans*. Bruyning (p. 708) shows that an extensive treatment campaign of the people with diethylcarbamazine was followed by considerable reduction in the parasite index of this mosquito and a smaller reduction in the microfilaria rate in man.

In Gambia McFadzean (p. 297) tried corticotrophin for treatment of elephantiasis of the leg, but there was no indication of benefit; the volume of the legs could be reduced by rest in bed. Kanakaraju (p. 1083) describes a modification of the Kondoleon operation for elephantoid legs.

Hamon (p. 298) discusses resistance to DDT in *Culex fatigans* in Réunion, where it is the principal vector of *W. bancrofti*. Resistance appeared about 1 year after the beginning of an insecticidal campaign. In British Guiana *C. fatigans* is relatively insusceptible to the action of insecticides, and though Charles (p. 81) shows that chlordane either alone or with DDT is more effective than DDT or BHC alone, the general conclusion is that for eradication larvicidal measures are needed in addition to the use of insecticides.

Filariasis is common in the Marquesas Islands, where one-third of the people showed microfilariae of *W. bancrofti*. Rosen (p. 1276) found *Aëdes polynesiensis* on all the islands; this mosquito and the disease are probably of relatively recent introduction.

Measurements carried out by Galliard and Chabaud (p. 420) on a male and female *W. bancrofti* of non-periodic type did not conform to some of the criteria suggested by Buckley for distinguishing the periodic and non-periodic types.

Kessel *et al.* (p. 503) in Tahiti have used diethylcarbamazine in two dosage schedules:—2 mgm. per kgm. 3 times daily for 7 days, repeated if necessary a year later; the same dose given on one day each month for 12–18 months. The first gave good results in reducing the rate of microfilaraemia, and the second promises to be a practical method of administration in a filariasis control programme. Marked reduction in microfilarial density was observed, but it has yet to be determined if this suffices to limit transmission to a level at which clinical cases will not be found.

Wuchereria malayi:—

In part of Siam filariasis is endemic, and Iyengar (p. 619) found circulating microfilariae in 21 per cent. of persons examined in some villages, and disease in 5·2 per cent. All local infections were due to *W. malayi*, and the vectors are named. Control is difficult, and larvicidal measures would be uneconomic; the use of residual DDT spray, however, seems to be promising.

Mille (p. 1079) reports on surveys of the microfilarial rates for *W. bancrofti* and *W. malayi* in North Vietnam, where both occur and the latter is the more prevalent. The distribution of the species is different. In North Vietnam chyluria is common in filariasis patients in hospital. Huard (p. 296) reports a study of the condition which should be read in full. Treatment with diethylcarbamazine is very successful in acute cases, less so in chronic cases. He discusses cystoscopy and surgical measures of treatment. Friess *et al.* (p. 1082) describe a syndrome, in soldiers from Indo-China, of adenopathy, eosinophilia and asthmatic bronchitis, which conforms generally to the condition known as tropical eosinophilia, but which, they think, probably arises from infection with *W. malayi*. Diethylcarbamazine is useful in treatment. A similar account is given by Crosnier *et al.* (p. 1082).

In Ceylon the water lettuce *Pistia stratiotes* is associated with the development of the species of *Mansonia* responsible for transmitting *W. malayi*; and manual removal of this plant is expensive and ineffective. After experiments with various substances Chow (p. 421) and Dassanayake and Chow (p. 1277) found that treatment of water with the herbicide Phenoxylene 30 was effective in eliminating the plant; it has no ill effect on man or animals.

Dirofilaria immitis, etc.:—

A study of *Aëdes aegypti* in relation to ingestion of *Dirofilaria immitis* is reported by Kershaw *et al.* (p. 83), who investigated the numbers of microfilariae taken up by the mosquitoes; they suggest that mosquitoes which do not take up many microfilariae may be relatively good vectors because there is a high mortality in those which take up large numbers. Compared with controls fed on non-filarial blood, the mosquitoes which feed on infected dogs have a relatively high mortality.

Kartman has made a number of studies on the transmission of *Dirofilaria immitis*. He (p. 959) defines the host efficiency ratio and the infection rate

in transmission of filarial infections, and from these and the survival rate he calculates an index of experimental infection which numerically expresses the vector potential of mosquitoes. He (p. 200) studied the loss of microfilariae from the anus of *Anopheles quadrimaculatus* during the act of feeding, but concludes that this loss is not significant in relation to host efficiency. He (p. 298) made experiments on the infectivity to mosquitoes of microfilariae of *D. immitis* in dogs which had been infected by blood transfusion. He fed the mosquitoes at various times after the transfusions, and the experiments suggested that the microfilariae may have to undergo a short aging period before they attain maximum infectivity for the mosquito host. He also (p. 620) reports on the frequency and intensity of infections in various mosquitoes fed on infected dogs, and the growth of the embryos in the mosquitoes.

Bertram (p. 710) describes his technique for maintaining strains of *Bdellonyssus bacoti*, the vector of *Litomosoides carinii*, and for infecting cotton-rats in their nests.

Loa loa; *Dipetalonema perstans*:—

Members of the staff of the Liverpool School of Tropical Medicine have conducted extensive researches into problems of filariasis in the British Cameroons. Kershaw and his colleagues (pp. 709, 962) have found that the incidence of *Loa loa* is high in the rain forest where the proved vectors *Chrysops silacea* and *C. dimidiata* are present, and that incidence decreases in the abrupt forest fringe; the infection is not found in the gradual-transition zone and the grassland. *Dipetalonema perstans* is common in the rain forest where various species of *Culicoides* are found, but is less so in the abrupt forest fringe and the gradual-transition zone. It is not found in the grasslands. These features are discussed. These workers (p. 963) investigated the intake of *L. loa* and *D. perstans* by *Chrysops silacea*, concluding that this fly almost certainly feeds exclusively from a pool of blood made by it in the tissues, and that the larger and slower microfilariae of *L. loa* would pass less readily into this pool than the microfilariae of *D. perstans*. The intake of *L. loa* therefore cannot be estimated accurately by observing the size of the blood meal and the concentration of microfilariae in the peripheral blood.

In studies of the effect of light on the biting activity of *Chrysops silacea* in the British Cameroons, Kettle (p. 1084) recorded a close correlation with intensity of illumination at canopy level but not so close at ground level. In similar work Crewe (p. 1084) did not obtain the same results, but suggests that Kettle's results may be explained by assuming that the normal habitat of *C. silacea* is above the forest canopy.

Nicholas (p. 82) reports an investigation of the feeding habits of *Culicoides austeni* and other species. He has been able to maintain *C. austeni* long enough after oviposition to take a second blood meal, which would be essential for transmission of *D. perstans*. Larvae and pupae live in the stumps of banana plants and the plantain. Resting places of adults may be indoors or among banana and plantain leaves. The numbers of biting *Culicoides grahami* and *C. austeni* fall off rapidly at 250–700 yards from breeding places in open areas of the British Cameroons; Nicholas (p. 1084) has observed that the dispersal of *C. grahami* in clearings differs radically from the dispersal in forests.

In *Loa loa* infection Galliard and Larivière (p. 299) found that injection of corticotrophin did not reduce the eosinophilia, and suggest that this might have been due to diminution of secretion of the suprarenal cortex.

Onchocerca volvulus:—

Crosskey (p. 1085) reports a survey made in Northern Nigeria for the estimation of the prevalence of *Onchocerca volvulus*, for which *Simulium damnosum* is the vector. He found microfilariae in 43 per cent. of males, and nodules in 13 per cent.; figures for females were lower [the original abstract reversed the figures for microfilariae in males and females, but the table on p. 1086 is correct]. Total blindness was found in 1·1 per cent. There is evidence that infection declines some 5 miles or more from the river which is the breeding place of the vector. In the Black Volta area Holstein (p. 201) has found onchocerciasis in 53·5 per cent. of men and lower proportions of women and children. *Simulium damnosum* was very prevalent in April–June, when the survey was made, and was very aggressive, biting practically all day and entering houses up to 600 metres from the river. Infection was found in 18·5 per cent. of these flies, and 2·8 per cent. were infective. Ovazza (p. 621) has made a study of the transmission of *Onchocerca volvulus* in part of French Equatorial Africa, where although several species of *Simulium* are found, only 2—*S. damnosum* and *S. albivirgulatum*—were observed to bite man. Only *S. damnosum* was found to be infected. The distribution of the two species is affected by the speed of flow of the water in which breeding takes place, the presence or absence of eddies of air over the rivers, and the intensity of light.

Lewis (p. 743) records the known distribution of Simuliidae in the Anglo-Egyptian Sudan, and discusses water speed and size of the breeding places in relation to breeding.

Ruiz Reyes and Gonzalez Paredes (p. 710) report a survey of onchocerciasis in Mexico, where *Simulium ochraceum* is abundant; the area of infection in Central America appears to be extending. In Guatemala Dalmat and Gibson (p. 85) have marked, released and recaptured various species of *Simulium*. They record flights up to 2·9 miles, and note that there is probably a high mortality in flies within the first few days of becoming initially infected and marked.

A histological study of nodules in onchocerciasis is reported by Pellissier (p. 504) who notes the initial inflammatory reaction followed by a foreign-body type of reaction and later, but patchily and infrequently, by destruction and liquefaction of the parasites.

Mazzotti (p. 503) has found adult *Onchocerca volvulus* of one sex only in 41 per cent. of a large number of nodules examined, and adults of either sex in the remainder. Kershaw *et al.* (p. 1279) investigated the concentration and distribution of the microfilariae of *Onchocerca volvulus* in patients, finding a clear pattern in the numerical distribution which was related to the distribution and severity of the skin lesions and the eye changes. It is possible that control measures directed against *Simulium*, even if insufficient to lower the incidence of the disease in man, may reduce the more severe complications.

Lapeyssonnie *et al.* (p. 1081) describe a hyperkeratotic dermatitis with microfilariae of *Onchocerca volvulus* in the lesions. The Africans attribute the disorder to horses and it is prevalent in the rains when *Culicoides* are common. The authors speculate whether domestic animals may form a reservoir and the disease be transmitted by insects other than *Simulium*.

Toulant and Boithias (p. 1194) describe the retinal changes in onchocerciasis associated with damage to the optic nerve, stating that lesions in the fundus appear to be responsible for 30–40 per cent. of onchocercal blindness, and keratitis and iridocyclitis for the rest. Optic atrophy is not always a late phenomenon. The same authors (p. 1298) discuss in detail the ocular lesions in onchocerciasis. Boithias and Brumpt (p. 821) make

the point that it is often possible to make a diagnosis of onchocerciasis by ocular biomicroscopy when cutaneous biopsy is negative.

Tests of various chemicals for the control of *Simulium* in Guatemala are reported by Lea and Dalmat (p. 1314).

Ruiz Reyes (p. 85) reports on treatment of onchocerciasis with suramin, which kills the adult worms and embryos, and with diethylcarbamazine, which kills the embryos and has a good effect on skin and eye lesions.

After treatment with one or two doses of Antrypol [suramin] about half of a group of children with onchocerciasis were freed from the skin infection. In this work in the Northern Territories of the Gold Coast Colbourne (p. 711) used smaller doses (20 mgm. per kgm.) than another worker has recommended, but even with bigger doses the results were not so good as have been found in Southern Gold Coast.

In 1946 *Simulium neavei* was eradicated from certain rivers in Kenya by the use of DDT. Garnham and McMahon (p. 821) report that annual surveys for the following 8 years failed to detect flies, but although transmission has ceased the disease lingers on in some persons, and dramatic results as in malaria control are not evident.

Dracunculus medinensis infection

Guineaworm infection is serious and painful, and in the French Sudan half the population of a village may be immobilized by it for some days, or even longer. Rousset (p. 202) gave diethylcarbamazine to a group of Africans at a time shortly after the main infecting season, and the history of these persons, and of the same number of comparable controls, indicated a marked prophylactic action. The same drug was apparently useful in treatment of patients showing adult worms.

Enterobius infections

Winkler (p. 1087) reports that the incidence of *Enterobius* infection reaches 80 per cent. in children aged 6 years in parts of Germany. A general paper on helminthiasis in Czechoslovakia has been published by Jírovec (p. 505). *Enterobius* and *Trichuris* infections are the most common. In examination of children on the island of Ischia for infection with *Enterobius*, Ricci (p. 86) has found positive results in up to 52·45 per cent. There seems to be a maximum infection rate at the beginning of summer, possibly because children are released from school restrictions and tend to gather together, for instance on bathing beaches.

Jones (p. 963) has examined the incidence of *Enterobius* in white and Negro patients with poliomyelitis. The incidence in general was low but eggs are disseminated at times when the virus of poliomyelitis may be present in the alimentary tract; the subject of possible transmission of viruses in this way needs experimental study.

Norn (pp. 623, 1280) describes a modification of the adhesive Cellophane technique for the diagnosis of *Enterobius* infection; one feature is that immersion oil is placed between the Cellophane and the slide, and the eggs appear with a "shining radiance" in the optically clear preparation. To exclude the infection 4–5 swabbings, preferably in the morning, are needed.

Kean (p. 203) describes the treatment of *Enterobius* infection, emphasizing the importance for children of a special sleeping garment which prevents anal contamination of the fingers.

Standen (p. 87) tested 16 substances against infections of mice with *Aspicularis tetraptera*, concluding that gentian violet and piperazine hydrate were promising, and that the latter could be tried in human cases of *Enterobius* infection. Following up this work White and Standen (p. 86)

gave piperazine hydrate syrup at a daily dose level of 50–75 mgm. per kgm. in the treatment of *Enterobius* infection in children. The course lasted for 7 days, then an interval of 7 days, and a second course lasting 7 days. Results were better than those with gentian violet and diphenan, and side effects were negligible. After comparative tests of piperazine hydrate, oxytetracycline and a garlic preparation for the treatment of *Enterobius* infection, Bumbalo *et al.* (p. 1281) conclude that the piperazine is the drug of choice, equal to gentian violet but with fewer side effects. It was given as an emulsion containing 100 mgm. per ml. thrice daily for 2 periods of 7 days, with an interval of 7 days. The dose was half a teaspoonful for children up to 5, one teaspoonful for those aged 5–10, and 1½ teaspoonfuls for those aged over 10. Deschiens *et al.* (p. 947) similarly write favourably of piperazine hydrate, which they use in doses of 0·1–0·2 gm. for children, and 0·4 gm. for adults.

White and Standen (p. 423) discuss the side effects sometimes noted with piperazine hydrate. They are usually mild, and are attributed to overdosage.

Bumbalo *et al.* (p. 505) compared the results obtained in the treatment of children with *Enterobius* infection by means of Egressin, diphenan, gentian violet and oxytetracycline, concluding that the last two, which gave 82 and 84 per cent. of cures, were the most successful. Oxytetracycline should be used with caution. Askue and Tufts (p. 1281) write fairly favourably of phthalylsulphathiazole for *Enterobius* infection; it is not as potent as gentian violet, but does not produce the same gastro-intestinal irritation. Disappointing results in the treatment of *Enterobius* infection with aluminium ortho-oxy-quinoline sulphate were observed by Coutelen *et al.* (p. 423) in spite of more favourable reports by other authors.

Ramanujachari and Alwar (p. 1182) in Madras found in a pig a pinworm which appeared to be identical with *Enterobius vermicularis*, and worms of the genus *Onchocerca*, which could not be more exactly diagnosed.

Trichuris infections

In histological examinations of the colon in children with massive infection with *Trichuris trichiura* Hartz (pp. 504, 712) could find no lesions which could be attributed to the infection, except for mechanical compression of the cells of the mucosa.

Trichuris infection may be treated with hexylresorcinol administered as a high enema. Basnuevo *et al.* (p. 422) give two formulae which they have found effective, and note that several treatments are usually given, at intervals of 10 days.

Trichinella infection

Semple *et al.* (p. 822) give an account of a recent outbreak of trichiniasis in Liverpool, which was traced to sausage meat in most cases, though in the absence of records it was not possible to trace it back to the piggery. One case was fatal, myocarditis developing, and it is emphasized that in this infection any suggestion of cardiac involvement should be treated seriously, as there is the possibility of sudden death. An outbreak of human trichiniasis in South Wales was traced to a pig from a farm on which rats were found to be the source of infection, rather than the food of the pigs. Evans and Lennox (p. 88) note that symptoms are usually slight in Britain, probably because pork is not eaten raw, and the dose is small. Peri-orbital oedema and eosinophilia, with muscle pains, are characteristic.

An outbreak of trichiniasis in Sweden, traced to an infected pig, is reported by Arvidsson (p. 965).

Juárez (p. 965) records 5 outbreaks of trichiniasis in Spain, in which there were some fatalities. He draws attention to the danger of private slaughtering of pigs. Luengo Miró (p. 967) thinks that there are many unrecognized cases of trichiniasis in Madrid, and that patients with eosinophilia are too easily diagnosed as suffering from some allergic condition, and are not investigated thoroughly enough.

Reactions to the intradermal test with *Trichinella* antigen suggest that subclinical infection may have occurred in reacting children who have no history of the disease (Roett *et al.*, p. 823).

In examination of a series of human diaphragms in Canada Poole (p. 204) found *Trichinella* infection in 7·3 and 6·5 per cent. respectively in Ottawa and Kamloops. These rates are higher than some recorded for other Canadian areas.

Trichiniasis is common in Mexico. Mazzotti (p. 205) quotes incidence figures, and notes that cats are heavily infected, but not pigs.

Larsh and Race (p. 1088) report a histological study of the small intestine of mice immunized against *Trichinella spiralis* and then given a challenge dose, and of unimmunized controls.

Experiments in mice infected with *Trichinella* indicated that piperazine hydrochloride may be valuable in treatment. The doses used were high, and Chan and Brown (p. 1283) suggest that in man clinical trials might be made with piperazine citrate in doses of 2–3 gm. daily.

Gould *et al.* (pp. 205, 625, 967) think that the irradiation of raw pork by gamma rays can eradicate trichinosis, and that the large-scale use of the method is feasible. They have experimented with ^{60}cobalt.

Helvig and Weaver, and other authors (p. 1282) have written on the trichiniasis problem in the United States, where safe garbage disposal by incineration, burial or sanitary landfill is widely practised. Destruction of *Trichinella* larvae in garbage by cooking is increasingly being adopted. Control measures are discussed in relation to education and legislation, and the points relating to quick freezing are recapitulated, though this process is not yet ready for general adoption.

Gongylonema infection

In discussing a case of *Gongylonema* infection in a woman from Morocco, Gaud (p. 300) makes the point that *Blatella germanica* has proved a satisfactory experimental host, and is common in Morocco. The mode of transmission, however, is still open to doubt.

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria— *monkeys, other animals, birds.*

Trofimov, G. K. & Lysenko, V. F. [**Malaria in the Mountains of Southern Azerbaidjan**] *Med. Parasit. & Parasitic Dis.* Moscow. 1955, v. 24, No. 1, 26–30. [In Russian.]

The authors describe the results of a malaria survey, carried out in 1952, in the Karabakh mountains of Soviet Azerbaidjan. Malaria was found to be endemic in this region, the parasite index being 2·95 (39 out of 1,321 persons

were infected), represented chiefly by *Plasmodium vivax*, while *P. falciparum* occurred in isolated cases. The local vectors are *Anopheles maculipennis*, *A. superpictus* and *A. bifurcatus*, the first of which was predominant. The breeding places of the first two species are mountain streams.

The climate of the zone of Alpine meadows (above 2,500 m.) is unsuitable for malaria, but it is present in valleys at altitudes of 1,800–1,900 m., where cases of malaria and breeding places of *A. bifurcatus* were found. The incidence of malaria is higher in the lower valleys (800–1,200 m.), where the mountain streams favour the breeding of *A. maculipennis* and *A. superpictus*. *C. A. Hoare*

Collignon, E. & Juillan, M. Les indices endémiques palustres dans le voisinage de la Station expérimentale du Marais des Ouled Mendil en 1954. [**Malaria Endemic Indices in the Experimental Station of the Ouled Mendil Marsh and its Neighbourhood in 1954**] *Arch. Inst. Pasteur d'Algérie*. 1955, Mar., v. 33, No. 1, 45–7, 1 map.

The satisfactory state of affairs previously reported [this *Bulletin*, 1954, v. 51, 1030] continues to be maintained. Indeed, there is a notable improvement of the standard of living, as a result of the better use of the land for cash crops, and the people themselves are better fed, clothed and cared for. This raised standard also increases resistance to malaria and therefore prevents the development of reservoirs for its transmission. The usual spring and autumn inspection of children (335 and 296) showed average spleen rates of 2·7 per cent. *H. J. O'D. Burke-Gaffney*

Buezas Arias, U. Influencia del paludismo en la patología rural. (Nuestra experiencia de veinticinco años al frente de un servicio antipalúdico.) [**Influence of Malaria on Rural Morbidity. Experiences of 20 Years of Malaria Control**] *Rev. Sanidad e Hig. Pública*. Madrid. 1954, Nov.–Dec., v. 28, Nos. 11/12, 801–30.

Bagramjan, M. G. [**Parasitological Features of Malaria in Children of Soviet Azerbaidjan**] *Med. Parasit. & Parasitic Dis.* Moscow. 1955, v. 24, No. 1, 82. [In Russian.]

Between 1941 and 1947, in the course of a mass malaria survey of the population of Soviet Azerbaidjan, a total of about 120,000 thick blood films were examined. While among the positive findings for all age-groups *Plasmodium falciparum* was predominant, with *P. vivax* in the second place and *P. malariae* in the last, in children the incidence (per cent. of all positive cases) was 2 for *P. falciparum*, 31·9 for *P. vivax*, and 15·9 for *P. malariae*. Furthermore, the number of gametocytes per 1 cmm. was higher in children than in adults, the greatest number occurring in infants up to the age of one year. This difference was especially marked in the case of *P. falciparum* malaria, whereas in the case of *P. vivax* malaria it was insignificant. *C. A. Hoare*

Sinton, J. A. **Morphology of the Parasitized Erythrocyte in Infections with *Plasmodium ovale*.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, May, v. 49, No. 3, 286–7.

The author refers to the paper by Garnham *et al.* [this *Bulletin*, 1955, v. 52, Nov.] on the pre-erythrocytic stage of *Plasmodium ovale* and adds

some observations of his own. Examinations of *Plasmodium ovale* in fresh coverslip-slide preparations showed that although infected erythrocytes did not possess an oval or fimbriated outline, they were not of the normal discoid shape but globular. If pressure was applied to the coverslip, the infected cells tended to adhere and become distorted into oval or fimbriated forms. These observations suggest that the distortion of the erythrocyte characteristic of *P. ovale* is an artificial feature, and other considerations also support this view—the variation in numbers of cells showing distortion; oval cells lying with their long axes parallel; presence of such cells confined to thin parts of smears. It is emphasized that although the distortion is produced artificially, it still has great diagnostic value. *P. C. C. Garnham*

Jeffery, G. M., Wilcox, Aimee & Young, M. D. **A Comparison of West African and West Pacific Strains of** *Plasmodium ovale*. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Mar., v. 49, No. 2, 168–75, 1 fig.

The authors compare two strains of *Plasmodium ovale* originating from widely separated geographical areas. The strains were the Donaldson from the West Pacific [see this *Bulletin*, 1955, v. 52, 117] and the "Liberian" [see *ibid.*, 1954, v. 51, 668]. Observations were made on the morphology of the blood parasites, the mosquito cycle and the clinical features. The Liberian strain was slightly bigger and caused a slightly greater enlargement and distortion of the erythrocyte; the average number of merozoites was 8·8, compared with 7·8 in the Donaldson strain, and a greater proportion of schizonts contained 10 merozoites. The characters of the infection in the mosquito were about the same in the two strains; *Anopheles quadrimaculatus* again proved a better vector than two strains of *A. albimanus* and showed a biphasic pattern of infectivity (early and late); pigment in the oöcysts was often in the typical cross-formation. In man, the Liberian strain had a prepatent period of 14·5 days, and it proved infective to Negro patients. The attack was slightly more severe than in the Donaldson strain but terminated spontaneously after a short duration, though parasitaemia sometimes persisted for 4 months. The periodicity was 50 hours, compared with 49·5 in the Donaldson strain. Ten patients who had recovered from the latter were infected with the Liberian parasites and a considerable degree of cross-immunity was demonstrated; on the contrary there was little cross-immunity with the Chesson strain of *P. vivax*. The cross-immunity between these 2 strains of *P. ovale* is much more marked than was expected, when their widely separated origins are considered.

P. C. C. Garnham

See also p. 937, Cook & Foote, **Pictorial Keys to the Mosquitoes of Medical Importance. IX. Australian Region.** *Mosquito News.* 1955, Mar., v. 15, No. 1, 35–8, 2 figs.

Laarman, J. J. **The Host-Seeking Behaviour of the Malaria Mosquito** *Anopheles maculipennis atroparvus*. [Thesis.] pp. xi + 144, 19 figs. [Numerous refs.] 1955. Utrecht: Kemink en Zoon N.V., Domplein 2.

The feeding habits of female *Anopheles* mosquitoes are of great practical importance in the fight against malaria. It is well known that when faced with the choice between man and animal, some species may show a decided preference for human blood while others may prefer to feed on animals. It is obvious therefore that anthropophilism and zoophilism are not accidental; the mosquitoes are able by some means or other to orient themselves to

their blood supplier. However, as Dr. Laarman points out in Chapter I of the thesis, it is often difficult to say from the host selection tests of various authors whether it is the blood supplier himself or certain microclimatological factors of the space around him that attract the female mosquito.

A good deal of research has been done on the orientation mechanism in the Culicidae and Chapter II gives a useful and critical summary of the work done on the attractive action of various factors such as heat, moisture, chemical factors and mechanical stimuli in this process. From this the author concludes that the insects' orientation is based on a number of responses to different stimuli emanating from the host or his milieu. Certain of these stimuli can act only in the immediate vicinity of the host while others make possible localization of the host at greater distances. The objects of the author's investigations were: (1) to demonstrate in *Anopheles maculipennis atroparvus* the directive action of olfactory factors (other than CO_2), because it is obvious that in long-distance localization of the host olfactory factors are the primary ones; (2) to devise a technique to measure accurately the responses of *Anopheles* to the stimuli offered; and (3) to investigate the rôle of moisture, temperature and CO_2 in orientation. Mosquitoes may behave differently under the action of various stimuli. For example, they may hover about under a certain stimulus whereas when subjected to another stimulus they may actually alight and start probing movements. Behaviour analysis of *Anopheles* mosquitoes is still very much of a virgin field and the investigations recorded in this thesis are a very valuable contribution to the subject.

Chapter III describes the material and methods. The experiments were done with *Anopheles maculipennis atroparvus* caught from pig sties and also bred in the laboratory. The mosquitoes' reactions towards a current of test air (this was air passed over a rabbit or the human arm, or human expired air) containing the stimuli to be tested and a current of control air (ordinary air) were studied by means of an olfactometer. The experiments covered a number of years during which the apparatus and technique had to be refined or modified. As a matter of fact, the various difficulties which are liable to be encountered in an investigation of this kind are well brought out in this chapter. The behaviour of the insects in the air currents has been broadly divided into alighting and hovering movements.

The results are given in Chapters IV to VII and are discussed in chronological order. While this makes it possible for the reader to follow the author's train of thought, it has resulted in repetition of methods, results and conclusions. A review of the results in the order in which they are given may be confusing although the summary in Chapter VIII is quite useful.

The following are the author's general conclusions:

(1) Contrary to the general belief, unfertilized females of laboratory-bred *A. maculipennis atroparvus* were the first to start feeding. There was no marked difference in the biting propensities of small and large *atroparvus*; nor was there any direct connexion between the age of the mosquitoes and their reactivity.

(2) There was no significant difference in the reaction of "wild" mosquitoes caught from pig sties and mosquitoes bred in the laboratory, although bred mosquitoes seemed to be less attracted by air passed over the human arm than by air passed over a rabbit. The author attributes this to the fact that bred mosquitoes were maintained on rabbit's blood in the imaginal stages.

(3) Given a choice between a test air stream passed over a rabbit or the human arm and a control air stream, the mosquitoes were attracted to the

test air stream. This orientation persisted even when the factors heat, moisture and CO_2 were eliminated separately and very probably also in combination.

(4) Odours emanating from the host animal play an important part in the orientation mechanism of the mosquitoes. Blood certainly contains odorous substances and it is most probable that they play a part, *via* expired air, in the mosquitoes' natural orientation; for instance, a stream of air led through fresh rabbit's blood was extremely attractive to laboratory bred *atroparvus*, this incidentally being supporting evidence for the existence of adaptation to a given host. Again, human expired air and air passed over a rabbit (which presumably contain factors emanating from the blood in higher concentrations) were more attractive than air passed over the human arm.

(5) The factor CO_2 rather than attracting mosquitoes, activated their orientation behaviour; for instance, the addition of a high CO_2 content immediately raised the insects' activity.

(6) Long-distance localization of the blood supplier is primarily due to olfactory factors. Heat and moisture come into play only in the immediate vicinity of the host and cause the insects to alight. It is thus possible to assume the insects' search for food to be a chain of reactions to various successive stimuli. Heat has in addition a directive effect which, however, can come into action only in the presence of an activating stimulus such as CO_2.

(7) The existence of the " moisture replacing value " of the temperature stimulus in the orientation process is proved by the fact that mosquitoes can alight in undried unheated air currents as well as in dry currents containing a sufficiency of the factor heat (or a positive temperature gradient).

[The publication is a doctoral thesis and lacks the conciseness of a scientific paper. The mass of experimental detail, tables and graphs, although necessary in a dissertation of this kind, make the perusal of this paper a laborious process.] *M. G. R. Varma*

Blanton, F. S., Keenan, C. M. & Peyton, E. L. **Mosquitoes collected in Horse-Baited Traps in Panama during 1951 to 1953 Inclusive as an Index to Malaria Control.** *Mosquito News.* 1955, Mar., v. 15, No. 1, 39–42.

A brief review is given of the usefulness of different kinds of mosquito traps for the collection of different species of *Anopheles* in various countries.

In the present work horse-baited traps were used to keep an index of mosquito populations in all Army posts on the Atlantic and Pacific sides of the Panama Canal Zone. A list is given of the species identified together with the numbers obtained from January 1951 to the end of October 1953. In this time a total of 4,478 trap nights resulted in the capture of 161,284 mosquitoes. Of these, 6,602 were *Anopheles albimanus*, 17,960 *A. punctimacula*, 13,520 *Anopheles* of other species and 123,202 pest species. Comparison of the trapping results from different places certainly gave an indication of the efficiency of mosquito control measures. *H. S. Leeson*

Harris, F. C. **Intramuscular Chloroquine.** [Correspondence.] *Brit. Med. J.* 1955, June 25, 1533–4.

The author, from Kumasi, Gold Coast, describes what he believes to be the first recorded fatality due to overdosage of chloroquine.

A male Caucasian child of 1½ years, weighing 10 kgm., was admitted to hospital with a temperature of 103°F. He had received 2 tablets of Resochin the previous evening and one the same morning. On each occasion the tablets were vomited. The next day a few malaria parasites [unspecified] were found in the blood and the child was given 2 ampoules of Resochin solution (0·3 gm. chloroquine base) by the intragluteal route.

Some 4 minutes later, he rolled his eyes, appeared to recover, repeated this movement 2 or 3 times, and then after 5 minutes he suddenly collapsed and respiration ceased. Artificial respiration was unsuccessful.

The only abnormal findings at autopsy were a little vomitus in the trachea and bronchi, slight splenic enlargement and moderate congestion of the lung tissue. No malaria parasites were found in the brain.

Evidently the child had inadvertently been given 4 times the recommended dose of chloroquine and presumably this high dosage had caused a pronounced hypotensive attack. Chloroquine is known to produce a fall in blood pressure when given by the parenteral route.

The author points out that it is essential to give this drug on a basis of 5 mgm./kgm. body weight: at this dosage it is a safe and very effective antimalarial.

H. J. O'D. Burke-Gaffney

Kjaer, K. **Effects of an Overdose of Chloroquine in a Pregnant Woman.** *Amer. J. Trop. Med. & Hyg.* 1955, Mar., v. 4, No. 2, 259–62. [11 refs.]

The crew of a Danish hospital ship serving Korea was supplied with tablets of chloroquine, each tablet containing 0·3 gm. of the base; every member of the crew was told to take one tablet weekly. A woman aged 29, who was 5 months pregnant, was on board. In error she took several tablets; one hour later she had double vision and severe nausea, and fainted. She vomited several times and was very sleepy; there was difficulty in breathing and swallowing, and her respiration was much depressed. Paraesthesia and analgesia rapidly developed over the face and neck and these lasted for 2 or 3 hours; the diplopia, nausea and drowsiness, however, persisted for 36 hours. She then fully recovered: 5 days later she made a similar mistake in overdosage; again she had double vision, dizziness and nausea but these lasted only 24 hours. Four months later she bore a normal healthy infant. The doses she took are not precisely known but they might have been from 0·9 gm. of the base to 2·1 gm. of the base.

A. R. D. Adams

Schneider, J., Montézin, G. & Dupoux, R. Étude expérimentale et clinique de l'activité antipaludique d'une association de deux schizonticides: la chloroquine et la pyriméthamine. [**Experimental and Clinical Study of the Antimalarial Action of Chloroquine and Pyrimethamine in Combination**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 6, 791–5.

In experimental studies on mice infected with *Plasmodium berghei* the authors showed that a dosage of 2 mgm./kgm. of chloroquine base alone or of 0·05 mgm./kgm. of pyrimethamine hydrochloride alone was insufficient to control parasitaemia. When this dosage of the 2 drugs was given simultaneously, however, no parasites were observed from the 6th day onwards.

In preliminary experiments on human subjects suffering from malaria a dosage of 0·05 gm. of chloroquine together with 0·025 gm. of pyrimethamine

was found to be insufficient; the action was very slow and early relapses were observed in more than half the cases. But when a number of patients (9 *P. falciparum*, 12 *P. vivax*) were treated with half the minimum active dosage, *i.e.*, 0·15 gm. of chloroquine and 0·025 gm. of pyrimethamine, parasitaemia and pyrexia were controlled in all cases in approximately 1½ days.

This treatment had no effect on the gametocytes of *P. falciparum*, but those of *P. vivax* disappeared from the peripheral blood within 2½ days.

Thus these two drugs, which differ so widely in chemical structure, toxicity and mode of action, are apparently able to act as adjuvants to each other in respect of their schizontocidal properties. *G. Covell*

Fabiani, G. & Orfila, J. Influence de la splénectomie sur le paludisme expérimental à *Plasmodium berghei* de la souris blanche. [**Effect of Splenectomy on Experimental** *Plasmodium berghei* **Infection in White Mice**] *C.R. Soc. Biol.* 1955, Jan., v. 149, Nos. 1/2, 87–90.

Removal of the spleen in the course of a malaria infection usually results in a heightening of parasitaemia. In *Plasmodium berghei* infections of white mice the reverse occurs. Twenty-eight mice were splenectomized and within a week each received 10 million parasites by intraperitoneal inoculation (the standard dose employed throughout the experiments); the course of the infection was then compared with non-splenectomized controls and it was noted that in 24 mice the density of parasites was much lower in the former where the usual reticulocyte response was absent. Five mice were splenectomized and 3 weeks or more later were infected with *P. berghei*: in 4 the resultant infection resembled that of the controls. Fourteen mice were inoculated with *P. berghei* and splenectomy was performed either early or late in the resultant infection: once again the level of parasitaemia was depressed *pari passu* with the absence of reticulocytosis. Finally 7 mice were repeatedly bled in order to stimulate reticulocyte production (to the extent of at least 15 per cent.) 4 were splenectomized, and 3 had a simple laparotomy, and were then inoculated with *P. berghei*: parasitaemia now in the splenectomized animals was considerably higher than in the mice with the intact organ.

The authors deduce from these observations that (a) splenectomy interferes with reticulocyte production in the bone-marrow, (b) the absence of reticulocytosis entails poor parasite multiplication because reticulocytes are the cells preferred by *P. berghei*, and (c) if reticulocytosis is artificially stimulated, then a suitable milieu for the parasites is provided, multiplication progresses, and is even enhanced when the spleen is removed, because this organ provides a defensive mechanism of a limited kind.

P. C. C. Garnham

Vasina, S. G. & Zasukhin, D. N. [**Development of Tissue Forms of** *Plasmodium gallinaceum* **in Chick Embryos**] *Med. Parasit. & Parasitic Dis.* Moscow. 1955, v. 24, No. 1, 40–46, 4 figs. (1 on pl.). [In Russian.]

The authors describe observations carried out with cultures of *Plasmodium gallinaceum* in chick embryos, the chorio-allantois of which was inoculated with pieces of tissue containing EE forms. After cultivation for a week, embryonic erythrocytes were also invaded, but these parasites were

devoid of pigment, thus confirming ZUCKERMAN's observations [this *Bulletin*, 1947, v. 44, 504]. However, when inoculated into chicks, these parasites produced typical pigment. It is noted that EE schizonts gave rise to two types of merozoites: spindle-shaped (3·5 × 1μ), and rounded ones (2·5μ). The paper is illustrated by a series of figures. *C. A. Hoare*

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed*:—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

MULLIGAN, H. W. **Recent Investigations on Trypanosomiasis in British West Africa.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, May, v. 49, No. 3, 199–223. [33 refs.] Discussion 223–8 [DAVEY, T. H.; DUGGAN, A. J.; HOARE, C. A.; CHESTERMAN, C. C.; MULLIGAN, H. W. (in reply)].

This paper describes the work of the West African Institute for Trypanosomiasis Research—an organization established after the war to study human and animal trypanosomiasis in British West Africa, and directed until recently by the author. The research involved 4 principal subjects: entomology, epidemiology, protozoology and chemotherapy, and the main results have already been published, and have been abstracted in this *Bulletin*. Studies on the bionomics of *Glossina palpalis* led to the discovery of a new method for its control, *viz.*, "obstructive clearing" in which the larger trees are felled so as to allow the stream bed to become choked by low thicket and the consequent imprisonment of the fly; they led also to the discovery of a new survey method whereby tsetse flies are collected in large numbers in their natural resting places; finally, large-scale rearing of the species has been successfully accomplished in the laboratory. A useful summary is given of the epidemiology of the disease in Nigeria, Gambia and Sierra Leone. Perhaps the most interesting work done by the Institute was the adaptation of *Trypanosoma vivax* in small laboratory animals, and immunological problems arising from this research are still being investigated. The successful infection of *G. palpalis* with *T. vivax* at a rate of above 80 per cent., if long "strains" of trypanosomes are chosen, should enable much more precise observations to be made on the nature of the cycle of this organism in the fly. Interesting work is in progress in the chemotherapy of human and animal trypanosomiasis.

A long and interesting discussion followed Colonel Mulligan's paper.

P. C. C. Garnham

HARLEY, G. W. & MILLER, M. J. **Human Trypanosomiasis in Northeastern Liberia.** *Amer. J. Trop. Med. & Hyg.* 1955, Mar., v. 4, No. 2, 249–53, 3 figs.

Human trypanosomiasis was first recorded in the Northernmost tip of Liberia in 1933 [this *Bulletin*, 1933, v. 30, 635]. In the 10-year period 1944–53, 5,214 cases of this disease were treated at Ganta dispensary; these constituted 10 per cent. of all the out-patients seen there. The methods of

examination included blood examinations and gland punctures, but lumbar puncture could only rarely be done. Most of the patients showed signs of advanced disease with central nervous system involvement. The numbers treated annually, and their age distributions during each year, are depicted in graphs; the incidence of detailed cases in the populations of various areas of the district is shown in a map. Though these figures suggest some reduction in the number of cases during the second 5 years, this may well be due to factors other than illness which determine the attendance of patients at the dispensary. The dispensary attenders represent only a sample of the sick, and do not afford an adequate index of the true numbers of sick people. Trypanosomiasis is obviously a disease of major importance in this area.

A. R. D. Adams

Ann. Soc. Belge de Méd. Trop. 1954, Oct. 31, v. 34, No. 5, 653–711, 11 charts & 2 folding maps. [20 refs.] Déclin et danger résiduel de la maladie du sommeil à *T. gambiense*. (Vue d'ensemble du problème.) [**Decline and Residual Danger of** *T. gambiense* **Infections**] [Neujean, G. (653–61)]; **The Animal Reservoirs of** *Trypanosoma rhodesiense* **and** *Trypanosoma gambiense* [Fairbairn, H. (663–9)]; Déclin et danger résiduel de la trypanosomiase en Afrique Occidentale Française [**Decline and Residual Danger of Sleeping Sickness in French West Africa**] [Masseguin, A. & Taillefer-Grimaldi, J. (671–94)]; Discussion [Vaucel, M., President (695–711)].

This is a record of the papers and discussions on trypanosomiasis by contributors attending the 3-day medical conference held at Léopoldville in the Belgian Congo in September 1954 to celebrate the opening of extensions to the Princess Astrid Institute of Tropical Medicine.

I. Neujean, in an opening paper, reviewed the problem of *Trypanosoma gambiense* sleeping sickness in the Belgian Congo. The incidence of the disease as a result of steady endeavour has been reduced to a level which is no longer alarming. New trypanocides have overcome the difficulties of the treatment of drug-fast infections. Although it is not possible to envisage the destruction of *Glossina palpalis*, judicious agronomic prophylaxis has done much to restrict its distribution. Chemoprophylaxis with Antrypol, since it was initiated 15 years ago, has given encouraging results, but it suffers the disadvantages that this drug has to be given intravenously, and that the duration of protection it affords is uncertain and often is less than 3 months. The diamidines have proved more satisfactory; pentamidine is given intramuscularly and it protects for longer than does Antrypol. Improvements in the health of the people and in their sanitation doubtless also play their part in reducing the incidence of sleeping-sickness infection.

As a result of these and other measures the areas free from trypanosomiasis, despite the continued presence of tsetse, are steadily extending. The " index of circulating virus " in some places after chemoprophylactic campaigns fell almost to zero, and chemoprophylactic and chemotherapeutic campaigns have not been followed by the appearance of specific drug resistance. No evidence has accrued as to the existence of reservoirs of sleeping sickness other than man. There still remain potential dangers in such biological factors as occult infections in healthy carriers, of which our knowledge is imperfect. While vector and parasite persist there is a constant danger of recrudescing endemicity and epidemic explosion.

II. Fairbairn gave a well-documented account of the literature and of his own work on the animal reservoirs of *T. rhodesiense*. A strain of *T. rhodesiense* obtained from man in laboratory-bred *G. morsitans* in 1934 has since been maintained by tsetse transmission in sheep; it is still infective

to man. Collateral strains of this, similarly transmitted through a variety of antelopes and monkeys, also remained infective to man for many years. Numerous other animals and birds have proved susceptible to *T. rhodesiense* infection. On epidemiological grounds, also, it seems clear that game can act as a reservoir of *T. rhodesiense* infection of man. In the author's opinion the game undoubtedly is a reservoir of *T. rhodesiense* infection to man.

Similar work indicates that *T. gambiense* can be established in various animals, both wild and domestic, and can be transmitted cyclically for years while remaining infective to man by cyclical transmission.

There is some difference of opinion as to the main source of blood meals for tsetse flies in various parts of Africa. In some studies mammalian blood has predominantly been thought to be the food supply, but in others non-mammalian blood, such as that of crocodiles, seemed to preponderate. Many of these records are based only on field observations. With improved techniques and better specific antisera the time has now come for a more detailed laboratory study of the precise animals from which tsetse obtain their blood meals. Such a study should be developed on a large scale in Africa in order to solve the problem.

III. Masseguin and Taillefer-Grimaldi dealt with the incidence of sleeping sickness in French West Africa since it was first recognized there in 1876. Since 1934, when some 51,000 cases of the disease were disclosed throughout the territory, there has been a steady and spectacular decline in the incidence of endemic sleeping sickness. The period can be divided into three stages. Between 1934 and 1942 from 20,000 to 30,000 new cases were disclosed each year; between 1943 and 1948 the figure fell to 20,000 and between 1949 and 1953 it continued steadily to fall from 11,000 in 1949 to about 7,000 in 1953. Though the fall throughout the country as a whole was steady and marked, the decline in various regions of it was irregular. In the savannah region of Senegal the decline in incidence was slow but progressive, in the Soudan it was irregular, but in the forest regions of Guinea and the Ivory Coast it was disquietingly slow. While the original main foci of hyperendemicity largely vanished, others, of lesser importance but more difficult to eradicate, made their appearance. It seemed that when dealt with in the savannahs in the north sleeping sickness retired to the forests of the south, where it resisted eviction. The details of annual surveys through the country as a whole, and for each territory of it, are clearly set out in a number of tables, graphs and maps; comments on these are made in the text.

The differences in the results obtained in the savannah areas and those in the forest areas are attributable to the amenity of the savannah populations and their active cooperation in measures to combat the disease. These included regular examination and treatment of the infected, agronomic prophylaxis at river crossings and other focal areas of infection, and control of population movement, with chemoprophylaxis in only a few very restricted areas. In the forest areas, on the other hand, in addition to climatic and geographical difficulties, the populations were neither amenable nor cooperative, and agronomic prophylaxis was difficult or impossible.

At the present juncture there are residual foci of trypanosomiasis throughout most of the territories of French West Africa. It would be a grave error to minimize their importance and to relax efforts to control and eradicate the disease. Any laxity would result in a rapid resurgence of sleeping sickness which would nullify the effect of 20 years of struggle against it. Examples of recent recrudescences, for example in the Haute-Volta and Senegal provinces, serve as a warning of what would take place

on a much larger scale in the event of neglect. The cause of these particular local outbreaks was not clear, but adequate agronomic prophylaxis, the eradication of *Glossina*, and the destruction of game all are impracticable in the denser forest regions. Chemoprophylaxis of all the inhabitants of the forest areas, and so sterilization of the reservoirs of the infection there, is equally impossible for a variety of reasons.

The control of residual sleeping sickness must rest on strict supervision and regular examination of the population, chemotherapy and chemoprophylaxis of the infected, the closest collaboration of the health departments of all the neighbouring African territories, and further research into the ecology and the physiology of the trypanosome and of the tsetse fly to aid the epidemiologist in his task of combating both.

IV. Discussion by a considerable number of speakers thereafter took place under the presidency of Vaucel. Rodhain referred to the masking of active infections by chemoprophylactic injections, which may cause the patients to become concealed foci of infection for others, with resultant fresh outbreaks of the disease. He was sceptical of the alleged non-transmissibility of parasites from chronic cases. Richet re-emphasized the former point; and said that chemoprophylaxis can be used only in a focal area, and it is not possible to apply it to more than 80 to 85 per cent. of the population of that area. Schoenaers referred to cases of latent animal trypanosomiasis within his experience. Well-nourished healthy cattle in the Belgian Congo were found to harbour fewer parasites in the blood than ill-nourished, and to suffer less from signs of the disease. Eddey mentioned 2 untreated cases of *T. gambiense* infection in the Gold Coast which a couple of years later were still harbouring parasites in the peripheral blood without any increase in their symptoms. Azevedo quoted similar cases in Portuguese Guinea and said that the resistance of the African there to the disease bears a direct relationship to his nutritional state. Waddy gave a brief account of the successful control of trypanosomiasis in the Gold Coast by mass survey and treatment of the infected, without resort to chemoprophylaxis. The continuance of the disease in certain areas arouses suspicion as to the presence of some unknown reservoir of infection, and the continued occurrence of epidemics in forest areas indicates the need for sustained vigilance. Others contributing to the discussion included Masseguin, Evens, Schneider and Firquet, and the contributors of the papers further elaborated their views. Fairbairn said that at Tinde (Tanganyika) infected tsetse extruded from 15 to 4,000 parasites on probe tests; the conclusion was reached that 350 to 400 metacyclic trypanosomes were necessary to infect man.

A. R. D. Adams

London School of Hygiene and Tropical Medicine. Memoir No. 10. **The Natural History of Tsetse Flies. An Account of the Biology of the Genus *Glossina* (Diptera)** [Buxton, P. A. (C.M.G., F.R.S.)]

This book was reviewed on p. 853.

Janssen, P. Le Test de Thorn dans la maladie du sommeil. (Note rectificative.) [**The Thorn Test in Sleeping Sickness**] *Ann. Soc. Belge de Méd. Trop.* 1954, Dec. 31, v. 34, No. 6, 913.

The author of a previous paper with the above title [this *Bulletin*, 1955, v. 52, 342] writes to correct an error which occurred in it. He points out that of the 8 patients who gave an abnormal response to the adrenaline

test, 3 gave a corticotrophin test indicating hypophyseal inadequacy and 5 gave a corticotrophin test indicating suprarenal inadequacy.

These figures are the reverse of those given in the original paper and the relevant passage in the second paragraph on p. 343 of the abstract referred to above should be corrected accordingly. *H. J. O'D. Burke-Gaffney*

Silva, M. A. de A., Caseiro, A., Carmo, R. P., & de Basto, A. X. **Arsobal in the Treatment of Rhodesian Sleeping-Sickness.** *Anais. Inst. Med. Trop.* Lisbon. 1954, June, v. 11, No. 2, 261–85. English summary.

Arsobal (or Mel B) has been used for the treatment of African patients suffering from *Trypanosoma rhodesiense* sleeping sickness in Mozambique. The diagnosis was established in the case of most of these patients in 1951, 1952 or 1953. The patients, all of whom were in hospital, could be divided into 3 clinical groups:—Group I consisted of 130 newly diagnosed, who suffered from central nervous system [CNS] involvement; Group II of 34, also suffering from CNS involvement, who previously had unsuccessfully been treated with antrypol and tryparsamide, or with pentamidine and tryparsamide; and the last group consisted of a single first-stage case previously untreated. Three batches—Nos. 102, 103 and 104—of the drug were used. A course of treatment in all cases was 3·6 mgm. of Arsobal per kgm. of body weight; this was usually divided into 4 injections which were given daily or every third day [? alternate days], but in some cases the injections were given irregularly or at other intervals. Rarely, the treatment was repeated after some months.

Most of the patients were followed up for 6 to 14 months. The results were not very consistent, but in the Group I cases it seemed that 50 patients (38·4 per cent.) were cured, and there was substantial improvement in another 31 cases. Of the 34 Group II cases, who had had previous treatment, it seems from the evidence so far available that 10 may be considered cured. The single early case of Group III also was cured. As tryparsamide is ineffective in the great bulk of late-stage cases of *T. rhodesiense* infection, the results obtained with Arsobal are much superior to those following tryparsamide treatment. It was noticed that Arsobal treatment when unsuccessful initially did not produce a better result if repeated within 12 months. Study of a small number of very ill patients indicated that preliminary treatment with a small dosage of tryparsamide improved their general condition, so that Arsobal treatment could then be given with less risk of grave toxicity with collapse and death of the patient.

The toxic potentiality of Arsobal is high, and its use caused fatalities in 11 cases. Of the 3 batches of drug used No. 102 seemed the least toxic and least prone to cause encephalopathy and the lesser toxic manifestations. The authors consider its toxicity to be the greatest deterrent to the use of Arsobal. This drug should be given only in hospital; early cases of trypanosomiasis which yield to Antrypol or pentamidine treatment should not be exposed to the then needless risks associated with the employment of Arsobal. *A. R. D. Adams*

Glover, P. E., Jackson, C. H. N., Robertson, A. G. & Thomson, W. E. F. **The Extermination of the Tsetse Fly,** *Glossina morsitans* **Westw., at Abercorn, Northern Rhodesia.** *Bull. Entom. Res.* 1955, Apr., v. 46, Pt. 1, 57–67, 1 fig.

The particular interest of this paper is that it gives an account of the gradual development of knowledge and with it the modification of the

technique of tsetse control which was finally achieved, it appears, several years ago. Abercorn in Northern Rhodesia lies close to the border of Tanganyika near the southern end of Lake Tanganyika at an altitude of nearly 5,000 ft. Cattle were suffering from trypanosomiasis transmitted by *G. morsitans*; the fly belt was almost isolated, with the lake on one side and high land on the other. The problem was studied in 1935 and onwards by the late Mr. Swynnerton and the late Dr. B. D. Burtt and fly pickets were established as long ago as 1936 to reduce the carriage of flies upwards from the lowland by the lake to the farmed area. In the same year complete fire exclusion was organized over an area of about 100 square miles with the intention that the woody vegetation should become so thick as to render the area unsuitable to *G. morsitans*. It is always a difficult matter to organize fire exclusion and serious fires occurred from time to time: perhaps for this reason the reduction in the numbers of fly was only about 35 per cent. over the first 5 years, so that clearly fire exclusion was at the most an extremely slow method. In 1941 a very careful survey was carried out and it was found that there were concentrations of the fly in a particular type of small valley known as a " kasenga " in the Lungu language. This is a small narrow flat-bottomed valley in the headwaters of a river. When the trees in such a valley and along the edge of the surrounding woodland are felled, a rapid fall in the number of flies both in the valley and for a distance of a mile or more round it follows. A number of these valley sites were discovered in the following years and cleared, the last of them in 1952. From 1942 an occasional female, not freshly emerged but not yet inseminated (as shown by dissection) was captured. Such an event is exceedingly rare, indeed unheard of, in normal populations of *Glossina*, but here the fly population became so scarce that an increasing proportion of the female flies was found to be virgin, the figure rising to 29 per cent. by 1945.

The total area which was subjected to this clearing was less than 3 per cent. of the 280 square miles which came under study. The method is empirical for we do not know why these valleys are essential to the *G. morsitans* community, but the clearance has been completely successful. The pickets were maintained for a long time and the results are tabulated: it appears that the last flies were caught in May 1950 and the position as reported in 1952 and in the present paper is completely satisfactory.

P. A. Buxton

Werner, H. Über die Frage der placentaren Trypanosomen-Infektionen und Übertragung von Trypanosomen und Antikörpern durch die Milch auf das Neugeborene. [**Transplacental Infection with Trypanosomes and Transmission of these and of Antibodies to New-Born Animals through the Milk**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1954, Nov., v. 5, No. 4, 422–42. [Numerous refs.]

The author first gives a critical review of the literature on congenital infection with trypanosomes, and on transmission of these parasites and antibodies to the offspring through the mother's milk. Since the results of previous work were inconclusive, he carried out a series of experiments with the view to elucidating these questions.

In order to determine whether trypanosomes were capable of infecting the foetus *via* the placenta, numerous pregnant mice, hamsters, rats and guinea-pigs were inoculated with *Trypanosoma equiperdum, T. gambiense, T. congolense* and *T. cruzi*. When almost fully developed, over 900 foetuses of the infected animals were examined microscopically (blood films) and by

subinoculation of their blood into other animals, but in none of them were any trypanosomes detected.

Since failure to infect the foetuses might have been due to antibodies or phagocytosis in the embryos, agglutination (agglomeration) and adhesion tests were made with their blood against homologous trypanosomes, but in no case was any evidence of antibodies produced. Likewise, their blood contained no phagocytes with ingested trypanosomes. It was concluded that the maternal antibodies did not pass through the placenta.

Finally the examination of weaned young mice and hamsters, which had been born from and suckled by infected mothers, failed to reveal any trypanosomes. It was thus shown that the infection was not transmitted through the milk. There was also no evidence to suggest that the absence of a detectable infection might have been due to the presence in the offspring of antibodies transmitted with the mother's milk, for the course of experimental infection in young mice of both infected and normal mothers was similar. *C. A. Hoare*

Grignaschi, V. J. Parasitémie primaire à formes métacycliques de *Schizotrypanum cruzi* déterminée par le contact des déjections de *Triatoma infestans* avec la peau excoriée de la souris. [**Primary Parasitaemia of *Trypanosoma cruzi* produced by Metacyclic Trypanosomes in Droppings of *Triatoma infestans* after Contact with Excoriated Skin of Mice**] *Ann. Parasit. Humaine et Comparée.* 1954, v. 29, Nos. 5/6, 506–9, 1 graph.

It is generally held that, after infecting the mammalian host, the metacyclic forms of *Trypanosoma cruzi* undergo a development in subcutaneous elements of the reticulo-endothelial system before they invade the blood stream. The author describes the results of experiments designed to determine the exact moment when primary parasitaemia develops. For this purpose the hind legs of 10 mice were shaved, and the droppings of *Triatoma infestans* containing numerous metacyclic *T. cruzi* were placed on the slightly abraded surface of the skin, after which the animals were kept in a moist atmosphere for periods from 60 to 195 minutes. After exposure to infected faeces for 1 hour, the mice were sacrificed successively at intervals of 15 minutes, and the blood of each was inoculated subcutaneously into a clean mouse. The appearance of parasitaemia in the recipients was determined by daily examination of the blood from the 10th day of inoculation onwards, when they were also tested by xenodiagnosis, followed 20 days later by a second test. In two of the recipients trypanosomes appeared in the blood during periods from 0 to 75 and 105 minutes respectively from the time when they were exposed to the infected faeces. It was thus demonstrated that the metacyclic trypanosomes were capable of invading the blood directly. *C. A. Hoare*

Pifano C., F. El diagnóstico parasitológico de la enfermedad de Chagas en fase crónica. Estudio comparativo entre la gota gruesa, el xenodiagnóstico, el hemocultivo y las inoculaciones experimentales en animales sensibles. [**Parasitological Diagnosis of Chagas's Disease in the Chronic Phase. Comparative Study of Thick Film, Xenodiagnosis, Blood Culture, and Inoculation of Susceptible Animals**] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1954, Mar., v. 2, No. 2, 121–56. English summary.

After a critical consideration of the methods used for the diagnosis of Chagas's disease, the author describes a number of experiments carried out

in Venezuela with the object of evaluating the comparative effectiveness of the parasitological diagnosis of chronic infections with *Trypanosoma cruzi* in human beings and animals, by examination of thick blood films, xenodiagnosis, blood culture, and animal inoculation.

The experiments on animals were made with guineapigs and pups, inoculated intraperitoneally and on the conjunctiva respectively with different strains of *T. cruzi*, obtained from patients, infected animals, faeces of bugs, and cultures. The infections in these animals were studied for periods up to 2 years, by monthly blood examination and xenodiagnosis, and finally *post mortem*, for histopathology and tissue stages of the parasite. In the experimentally infected animals trypanosomes were seen in the blood for periods up to 6 weeks, after which they gradually disappeared, being only occasionally present in small numbers. But during the latent phase they were detectable by xenodiagnosis, culture and by subinoculation of clean animals.

Out of 1,240 *Rhodnius prolixus* fed on these animals, only about 48 per cent. became positive, and infection was revealed in 44 per cent. of the infected guineapigs. In xenodiagnostic tests of infected dogs, about 55 per cent. of the bugs became infected, revealing infection in about 73 per cent. of these animals.

The human material consisted of 157 chronic cases of Chagas's disease, in whom the infection had been diagnosed 5–10 years previously. Xenodiagnosis was applied with 1,753 bugs (about 11 per patient), and fed once. The results were positive in 83·3 per cent. On the other hand, only about 3·2 per cent. of thick blood films from these patients were positive, while inoculation of animals with the blood of 40 patients produced infection only in 12·5 per cent. of the pups but none in the guineapigs. In 80 patients with mixed infections xenodiagnosis was positive in 88 per cent. of cases, revealing *T. cruzi* in about 34 per cent., *T. rangeli* in about 44 per cent., and mixed infection with both in about 22 per cent. It was also shown that the chances of detecting human infections increased when xenodiagnosis was performed twice. As regards other diagnostic methods employed in these 80 cases, blood culture was positive in about 31·3 per cent., including 20 per cent. infections with *T. cruzi* and 80 per cent. with *T. rangeli*. In 10 chronic cases of Chagas's disease, xenodiagnosis was applied monthly in the course of one year. Of 120 tests only 58·3 per cent. were positive but when the tests were made at fortnightly intervals, positive results rose to 75 per cent.

These results are in accordance with the behaviour of *T. cruzi* in chronic infections, reflecting the intermittent release of parasites into the peripheral circulation. The investigation described in this paper indicates that, of all the diagnostic methods employed for the detection of chronic Chagas's disease, xenodiagnosis is the most reliable. *C. A. Hoare*

i. Pifano C., F. Nueva trypanosomiasis humana de la región neotrópica producida por el *Trypanosoma rangeli*, con especial referencia a Venezuela. [**New Human Trypanosomiasis of the Neotropical Region, produced by** *Trypanosoma rangeli*, **with special reference to Venezuela**] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1954, Mar., v. 2, No. 2, 89–120, 19 figs. [24 refs.] English summary.

ii. Floch, H. & Fauran, P. Discussion sur la nouvelle trypanosomiase humaine américaine. [**Discussion on the New Human Trypanosomiasis of America**] *Ann. Parasit. Humaine et Comparée.* 1954, v. 29, Nos. 5/6, 499–505. [11 refs.]

iii. Zeledón, R. Tripanosomiasis rangeli. [**The *rangeli* Trypanosomiasis**] *Rev. Biologia Trop.* San José, Costa Rica. 1954, Dec., v. 2, No. 2, 231–68, 2 figs. [61 refs.] English summary.

When Tejera [this *Bulletin*, 1921, v. 17, 97] described, under the name *Trypanosoma rangeli*, a new flagellate occurring in the Triatomid bug, *Rhodnius prolixus*, of Venezuela, he noted the morphological characters distinguishing this parasite from *T. cruzi* developing in the same bug, and suggested that it might represent a trypanosome of some vertebrate. Some years later de Leon recorded the occurrence in Guatemala of a human trypanosome differing from *T. cruzi* and developing in *Rhodnius*. Apparently in ignorance of Tejera's discovery, he named the new human parasite *T. guatemalense*, but Pifano and his associates [*ibid.*, 1948, v. 45, 1072], who demonstrated the presence of *T. rangeli* in human beings of Venezuela by xenodiagnosis with *Rhodnius*, identified *T. guatemalense* with Tejera's trypanosome. Since then numerous cases of human infection with *T. rangeli* have been described from Venezuela, Colombia and Guatemala.

The question of the identity of the new human trypanosome has been somewhat complicated by the nomenclature used by different observers and by the finding—and naming—of other mammalian trypanosomes in South America possessing characters similar to *T. rangeli*. In the 3 papers under review, detailed accounts are given of the history of the new American trypanosomiasis, and the nature of the trypanosome (or trypanosomes?) concerned is critically considered.

i. According to Pifano, *T. rangeli* is widespread in Venezuela. The examination of 8,564 *Rhodnius prolixus* revealed pure infections with *T. rangeli* in 41 per cent. and mixed (including *T. cruzi*) in 16·8 per cent. Among 1,124 human beings (chiefly children) examined by xenodiagnosis, 52·2 per cent. harboured *T. rangeli* alone and 9·9 per cent. *T. cruzi* as well. In 10 of the human cases *T. rangeli* was seen in the peripheral blood, while in 18 the flagellates were demonstrated by blood culture. In the endemic areas of Venezuela dogs are also commonly infected with this trypanosome, the incidence among 28 of 63 animals examined which showed trypanosomes being 32·2 per cent., in addition to which 14·3 per cent. also harboured *T. cruzi*. Natural infections with *T. rangeli* also occur in the local opossum, *Didelphys marsupialis*, which is regarded as the reservoir of human infection. Apart from dogs, mice and monkeys (*Cebus* sp.) are susceptible to experimental infection with *T. rangeli*, by inoculation of faeces from infected bugs or with cultures.

A description is given of *T. rangeli* from the blood of man and animals, and it is noted that no stages of division have been observed. In the vector, metacyclic trypanosomes develop in the hindgut, but the flagellates can also invade the body cavity and salivary glands.

The author discusses the nomenclature of *T. rangeli* and related trypanosomes, and concludes that both *T. guatemalense* de Leon, 1946, and *T. ariarii* Groot *et al.*, 1951 [*ibid.*, 1952, v. 49, 760], are identical with and therefore synonyms of *T. rangeli* Tejera, 1920. As regards some other mammalian trypanosomes from South America, which develop in *Rhodnius*, *T. myrmecophagae* from the anteater, *Myrmecophaga tridactyla*, is regarded as distinct from *T. rangeli*, but *T. diasi* [*ibid.*, 1953, v. 50, 1029] and *T.* sp. from *Cebus* spp. are considered to be closely related to it.

There is no evidence that infection with *T. rangeli* produces any symptoms in man: when clinical signs have been observed, they were due to a concomitant infection with *T. cruzi*. Since the endemic areas of both human trypanosomes usually coincide, it is important to differentiate between infections with *T. cruzi* and *T. rangeli* in epidemiological surveys.

ii. Floch and Fauran consider the nature of the new American trypanosome of man in the light of the discovery in French Guiana of a number of new mammalian trypanosomes. They seem to doubt whether *T. guatemalense* and *T. rangeli* are identical, and are inclined to accept the name *T. ariarii* for this trypanosome. On the other hand, they point out that since *T. cebus* Floch and Abonnenc, 1949 [*ibid.*, 1950, v. 47, (529)] (from monkey *Cebus fulvus*) is indistinguishable from *T. ariarii* Groot *et al.*, 1951 [*ibid.*, 1952, v. 49, 760] (which also occurs in *Cebus fatuellus*), the former name is by priority the correct name for the human trypanosome. As regards the other species, *T. advieri* (from the monkey *Ateles paniscus*) resembles *T. ariarii*, but *T. myrmecophagae* is longer than the latter.

The data regarding the differential characters of the simian and human trypanosomes are based on their measurements, a comparison of which is given in tabular form. [However, these figures have little statistical value since the number of trypanosomes measured in each case (40 *T. ariarii* and from 1 to 9 in the other species) was too small.] The authors conclude that the question regarding the nature of the American trypanosomes—other than *T. cruzi*—which are found in man and other mammals, all undergoing a development in Triatomid bugs, remains unsolved.

iii. Zeledón gives a detailed historical account of the Neotropical trypanosomes from man and some other mammals, all of which have similar characters and life-cycles distinguishing them from *T. cruzi*, and discusses their affinities and nomenclature. He agrees with the preceding authors that *T. myrmecophagae* is distinct from *T. rangeli*, and that *T. cebus* corresponds to the latter, but—unlike Pifano—he regards *T. diasi* as an independent species. He also finds no difference between *T. rangeli* and *T. ariarii*, both of which are transmitted by *Rhodnius* and develop not only in its gut but also in the haemolymph and salivary glands. However, he points out that *T. escomeli* Yorke, 1920, isolated by Escomel in 1919 from a patient in Peru, might—as suggested by Dias [*ibid.*, 1953, v. 50, 1128]—be identical with *T. rangeli*, in which case by priority the valid name for the new human trypanosome would be *T. escomeli*. The author then considers the case of a human infection with a *lewisi*—like trypanosome reported by Johnson from Malaya [*ibid.*, 1933, v. 30, 440], and concludes that there are no grounds for regarding it as *T. rangeli*, since it has been shown experimentally that *T. lewisi* does not develop in Triatomid bugs.

The author then records some original work carried out by him with cultures of *T. rangeli* and *T. ariarii*, which he regards as Venezuelan and Colombian strains respectively of the first-named species. Inoculation of new-born rats and mice with the "*ariarii*" strain resulted in slight infections in one of each of these rodents only, probably owing to attenuation of the virulence in the cultural forms of the trypanosome. Cultures of the *rangeli* strain were inoculated into the body cavity of *Rhodnius*, where they underwent multiplication, and in some cases also invaded the salivary glands. While in the haemolymph, the flagellates are ingested by phagocytes. It is thought that the development of *T. rangeli* in the body cavity is comparable to its behaviour in artificial cultures, the predominant stage in both being crithidial. Finally, it is recorded that all attempts to infect mice, rats, monkeys (*Cebus*), dogs and guineapigs by inoculation of infected haemolymph and cultures were unsuccessful. *C. A. Hoare*

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

Seganti, A. & Palombelli, M. Un nuovo focolaio endemico di leishmaniosi viscerale a Porto S. Stefano (Grosseto). [**A New Endemic Outbreak of Visceral Leishmaniasis at Porto San Stefano (Province of Grosseto)**] *Giorn. di Malattie Infettive e Parassit.* 1955, Feb., v. 7, No. 2, 60–68, 2 figs. & 4 graphs. [31 refs.]

An account of 15 cases of visceral leishmaniasis occurring between 1943 and 1951 in Porto San Stefano, Italy. The disease is believed to have been transmitted by *Phlebotomus* and dogs.

Kirchmair, H. **Kala-Azar in Irak.** *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1955, Apr., v. 6, No. 1, 122–4.

The English summary appended to the paper is as follows:—

"Kala-azar, or intestinal leishmaniasis, which was first discovered in Mosul Province of Northern Iraq in 1953, has now been found also in the vicinity of Baghdad. Three infantile cases successfully treated with solustibosan are reported."

Deane, Maria P. & Deane, L. M. Infecção experimental do *Phlebotomus longipalpis* em rapôsa (*Lycalopex vetulus*) naturalmente parasitada pela *Leishmania donovani*. [**Experimental Infection of** *Phlebotomus longipalpis* **with** *Leishmania donovani* **from Fox** (*Lycalopex vetulus*)] *Hospital.* Rio de Janeiro. 1954, Dec., v. 46, No. 6, 651–3.

The English summary appended to the paper is as follows:—

"Experimental infection of laboratory-bred *Phlebotomus longipalpis* was obtained on a recently found new host of *Leishmania donovani* in Ceará (Northeast Brazil), the wild dog *Lycalopex vetulus*, locally known as 'rapôsa' (fox). All 10 insects examined from 43 hours to 8 days after the infective blood meal contained abundant leptomonads; on the 4th day a massive infection of the oesophagus was found; from the 5th day on, the blocking of the oesophageal valve was noted in all specimens and one of the phlebotomi dissected on the 8th day showed groups of small, thin and very motile leptomonads in the distal portion of the epipharynx.

"At autopsy, numerous leishmaniae were found in the viscera and very numerous in the skin of the wild dog.

"These results agree with the authors' previous statements that the wild dog *Lycalopex vetulus* is an important reservoir host of kala-azar in the area studied and that *Phlebotomus longipalpis* is the vector of the disease among humans, domestic dogs and 'rapôsas'."

Shoshina, M. A. [**On the Mechanism of Transmission of Cutaneous Leishmaniasis**] *C.R. (Doklady) Acad. Sci. U.S.S.R.* Moscow. 1953, v. 92, No. 2, 447–8, 2 figs. [In Russian.]

It is generally held that the infective forms of *Leishmania* are located in the oesophagus and pharynx of the sandfly vectors, and that they are introduced into the mammalian host through the bite. However, among

the numerous attempts to produce experimental transmission through the bite of infected sandflies only a few were successful. Moreover, no explanation has been advanced to explain the mechanism whereby the flagellates are able to travel against the flow of incoming blood, and reach the wound produced by the vector when it feeds.

The author describes her findings in several infected female *Phlebotomus minutus* var. *arpaklensis* from an endemic area of oriental sore [presumably in Middle Asia]. The insects were in the 5th and 6th stages of digestion, and their intestine (mid- and hind-gut up to the anal aperture) was packed with motile leptomonad flagellates, which were clearly visible through the transparent wall of the gut, which had been dissected out *in toto*. After several minutes of observation it was seen that the flagellates, propelled by peristalsis, emerged from the anus together with the droppings.

The author regards these flagellates, produced at the end of the gonotrophic cycle (3 days) of the sandfly, as the infective forms. Their transmission is effected when the irritation caused by the bite of the sandfly causes the sufferer to react by scratching the punctured site, thereby exposing it to contamination by the infected faeces. It is concluded that cutaneous leishmaniasis can probably be transmitted not only through the bite of the vector but also by the contaminative method. The distribution of the flagellates in the gut of the sandfly is illustrated by a figure. *C. A. Hoare*

Nadzharov, A. J. [**Comparison of Sanitation Measures in a Focus of Urban Cutaneous Leishmaniasis**] *Med. Parasit. & Parasitic Dis.* Moscow. 1955, v. 24, No. 1, 53–7. [In Russian.]

The author describes methods employed by him for the control of an urban focus of oriental sore in Soviet Azerbaidjan. In the absence of mammalian reservoirs, these measures were directed against the human host and the sandfly-vector. It was found that the use of netting, bandaging the sores and their treatment were ineffective, since the incidence of infections was reduced only by one-seventh. However, systematic spraying of dwellings and outhouses with hexachlorane [benzene hexachloride], carried out in the course of 2 years (1950–52), proved to be highly effective, resulting in a diminution of the incidence of infection to one-third. *C. A. Hoare*

Floch, H. Sur deux observations intéressantes de leishmaniose forestière américaine. [**Two Interesting Cases of American Forest Leishmaniasis**] *Bull. Soc. Path Exot.* 1954, v. 47, No. 4, 509–12.

The first patient was a European woman with an ulcer on her leg which she had contracted in the interior of French Guiana. Leishmaniae were found and healing of the ulcer was obtained by the administration of the contents of 3 boxes [a box apparently contains 10 ampoules] of Glucantime, intramuscularly, twice a week. The ampoules contained 5 or 10 ml. of solution of drug. She returned to France where there was a relapse, a new ulcer appearing close to the healed one; later she was treated by daily injections of Glucantime. The author concludes that this second ulcer was a late developing primary ulcer and not a secondary manifestation, and that it is necessary to give Glucantime daily and in doses up to the limit of tolerance of the patient.

The second patient was a Creole who had typical lesions on his hand, arm and leg, in which leishmaniae were found. He was given a course of 7 injections of 5 to 20 ml. of Glucantime: he showed minimal improvement

but did not return for a second course. When he was seen again he had extensive lesions on the face and ears and a mucosal lesion on the nose, so that he presented the leonine appearance typical of leprosy. He had in the meanwhile varied and irregular treatment by antimony and arsenic compounds, but leishmaniae were still present. Further treatment with Glucantime in daily injections was given and the mucosal lesion and some of the cutaneous lesions healed, but at least 2 years after treatment had been first instituted and after a total of 50 boxes (according to the patient) of Glucantime as well as other antimony preparations, including Anthiomaline, had been given, he still had some typical lesions remaining.

The author concludes that American forest leishmaniasis is a serious disease, that the mucosal lesions may occur in Guiana, although they are rare, and that Glucantime is far from being superior to other antimonials in the treatment of the disease.

Jean Schneider, commenting on this report, considers that it is not possible to judge the efficacy of Glucantime on the evidence presented [a sentiment with which the reviewer heartily agrees]. He considers that the initial inadequate treatment in the second case was probably responsible for the development of antimony resistance. He also comments that several earlier workers who have used Glucantime for this condition have always emphasized the importance of daily injections and of large doses.

L. E. Napier

Corrêa, A. & Brito, G. da R. Traitement de la leishmaniose muqueuse sud-américaine par la diamidinophénoxypentane. [**Treatment of South American Mucosal Leishmaniasis**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 4, 513–17.

Fifteen cases of mucocutaneous leishmaniasis were treated by intramuscular or intravenous injections of diamidinophenoxypentane, Lomidine. The drug was supplied in ampoules of 5 ml. each of a 2·5 per cent. solution (= 125 mgm. of the drug). The patients were in hospital, and blood counts, liver-function tests, electrocardiograms and other examinations were carried out during the course of treatment. All the patients had mucosal lesions and 1 had an unusual lesion involving the tongue. The patients were given no local treatment or other anti-leishmaniasis treatment, but each received a preliminary course of antibiotics and anti-anaemics.

The amounts of the drug given at first were 10 to 30 ampoules, but it was found that, except in 1 case, 20 ampoules were insufficient to effect complete healing of the lesions so that 30 ampoules in 3 series of 10 days each was the course adopted. The injections were given daily for 10 days and this course was repeated twice with 10-day intervals between the courses. The intramuscular route was favoured on account of some unfavourable reactions (hypotension, etc.) that sometimes followed the intravenous injections.

About half the patients experienced anorexia, nausea or vomiting after the sixth dose in each course, but there were no ill-effects on the liver, kidneys or bone-marrow in any case. In 1, an electrocardiogram suggested some cardiac effect.

All the patients were cured, but it was not possible to follow them up so that it is not known if any relapsed. Four patients were seen 3 to 6 months later without any evidence of relapse. *L. E. Napier*

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

Weyer, F. Rückfälle bei Fleckfieber und Wolhynischem Fieber. [**Relapses in Typhus Fever and Trench Fever**] Reprinted from *Medizinische*. Stuttgart. 1954, Sept. 18, No. 38, 1267–71. [17 refs.]

This is a concise summary of the literature dealing with the subject of persistent infection and late relapses in louse-borne typhus and trench fever. Reasons are given for accepting the orthodox view on the occurrence of late relapses of typhus fever, which are referred to as cases of the Brill-Zinsser disease and are regarded as potential sources of fresh epidemics of typhus fever. This view is strongly supported by the records of cases in which *Rickettsia prowazeki* has been recovered from the blood of patients though there is surprisingly little evidence of the occurrence of outbreaks which have been undoubtedly attributable to transmission of infection to " contacts ".

Examples are quoted of the occasional persistence of *Rickettsia quintana* in patients for periods of 1 or 2 years, but there are very few records of the recurrence of the disease several years after the original attack and in these cases the possibility of reinfection has not been excluded.

John W. D. Megaw

Mohr, W. Die Rickettsiosen als Versorgungsleiden. [**The Rickettsioses as Persisting Diseases**] Reprinted from *Medizinische*. Stuttgart. 1954, Nov. 27, No. 48, 1600–604. [21 refs.]

This paper is on much the same lines as the one immediately preceding, and the bibliography consists for the most part of the same references.

The diseases discussed are louse-borne typhus, trench fever and Q fever. The points especially stressed by the author are:—(1) the prolonged period for which *Rickettsia quintana* can be detected in some cases by xeno-diagnosis; (2) the evidence that *R. burneti* hardly ever persists in this way; (3) the infrequency of permanent tissue damage after typhus fever, though a long list is given of cases in which severe after-effects have been reported, and (4) the great value of the complement-fixation test in the detection of persistence of infection by *R. prowazeki*. *John W. D. Megaw*

Ormsbee, R. A., Parker, Hazel & Pickens, E. G. **The Comparative Effectiveness of Aureomycin, Terramycin, Chloramphenicol, Erythromycin, and Thiocymetin in suppressing Experimental Rickettsial Infections in Chick Embryos.** *J. Infect. Dis.* 1955, Mar.–Apr., v. 96, No. 2, 162–7. [16 refs.]

The authors describe an extensive series of tests of the effectiveness of 5 broad-spectrum antibiotics in prolonging the survival period of chick embryos infected with various rickettsiae. Aureomycin [chlortetracycline], terramycin [oxytetracycline] and chloramphenicol are known to be effective in the treatment of certain rickettsial diseases, and two other antibiotics with a wide range of activity against Gram-positive and Gram-negative bacteria are now being tested against rickettsiae for the first time; they

are erythromycin and thiocymetin [a synthetic compound, related to chloramphenicol].

Oxytetracycline and aureomycin were found to be the most consistently effective in delaying the death of chick embryos infected with *Rickettsia rickettsi*, *R. akari*, *R. prowazeki*, *R. typhi* [*mooseri*] and *Coxiella* [*Rickettsia*] *burneti*; oxytetracycline being the more effective of these two.

Thiocymetin was equal to oxytetracycline in efficacy against *R. rickettsi* and *R. prowazeki*, and was slightly superior to it against *R. akari*, but was completely inactive against *R. burneti*.

Erythromycin was remarkably effective against *R. prowazeki* and was more effective than aureomycin against *R. mooseri*, but was only moderately effective against *R. rickettsi* and *R. akari*· it had a negligible effect against *R. burneti*.

An elaborate table shows the data on which these estimates of the effects of the drugs were based but a good general impression of the results of the experiments can be gathered from the following extract from a table which shows the relative quantity of each drug, in terms of mgm./kgm. needed to cause a delay of 4 days in the average time of death of the infected chick embryos.

Drug Concentration causing Average Delay of 4 Days in Death of Embryo

	Aureomycin	Terramycin	Chloramphenicol	Erythromycin	Thiocymetin
R. rickettsi	2·12	0·23	3·83	4·05	0·23
R. akari	2·14	0·32	3·44	8·95	0·27
R. prowazeki	1·93	0·30	4·48	0·38	0·30
R. burneti	2·54	0·27	31·7	—	—

These figures are not claimed to show exactly the relative activity of each drug in inhibiting the growth of each rickettsia in the infected chick embryos, but they do show in a general way the relative quantity of each drug that is needed to produce an arbitrarily chosen inhibiting effect on each rickettsia; they do not include estimates for *R. mooseri* because the data available were not sufficient.

The results were in general agreement with those obtained by Jackson with aureomycin and chloramphenicol [see this *Bulletin*, 1952, v. 49, 137]. It was pointed out by Jackson that her results would not necessarily be paralleled exactly by those obtained in clinical use.

Details of the technical methods employed and of the complicated manner in which the results were interpreted will be found in the paper.

John W. D. Megaw

Obál, F., Kelemen, L., Dézsi, Z. & Ravasz, J. Liquorveränderungen bei Flecktyphus. [**Changes in the Cerebrospinal Fluid in Louse-Borne Typhus**] *Acta Med.* Budapest. 1955, v. 7, Nos. 1/2, 135–45, 2 figs. [37 refs.]

Estimates were made of the sugar and chlorides of the cerebrospinal fluid of 118 typhus patients. In about one-third of the cases the sugar content began to fall towards the end of the febrile period, reaching the lowest point during the first week of convalescence and returning to normal 1 or 2 weeks later. The patients in this group had mild attacks. In the moderately severe attacks, about two-thirds of the total, the sugar had fallen far below the normal limits before the end of the fever. In the small group of very severe cases the sugar was greatly increased towards the end of the febrile period and fell below normal in early convalescence. The blood

sugar was usually higher than normal at the height of the fever; it began to fall towards normal by the end of the febrile period.

The chloride content of the cerebrospinal fluid was slightly subnormal in about half of the cases; it rose to normal during the 2 or 3 weeks after defervescence. In the group of mild cases the chloride level had risen high by the end of the fever and remained high during early convalescence. In the third group, which included the most severe cases, the chlorides remained constantly high from the middle of the fever period till the end of the 2nd or 3rd week of convalescence.

The blood chloride was normal or slightly lowered during the fever; during convalescence it was normal or slightly increased. It appeared that the chloride was rapidly eliminated from the blood by the kidneys but remained stored up in the cerebrospinal fluid for longer periods. *John W. D. Megaw*

Marty, J., Renner, R., Rispe, R., Bouvet, B., Navarranne, P. & Mollaret, J. Thrombo-artérite oblitérante diffuse rickettsienne. [**Diffuse Rickettsial Thrombo-Arteritis Obliterans**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1955, Nos. 5/6, 176–9.

A case is described in which an apparently healthy man, aged 20, was suddenly attacked with left-sided total hemiplegia 9 months after his arrival in Indo-China. During this time he had no illness. The only clue to the cause of the cerebral thrombosis, diagnosed by arteriography, was that the serum agglutinated *Proteus OXK* at a titre of 1 in 200.

Four months later the patient returned to France, still suffering from hemiparesis and diffuse arteritis in all 4 extremities. In complement-fixation and agglutination tests, carried out by Professor Giroud, positive reactions were found with the following antigens:— (a) of X14, from a case of exanthematic typhus in Bukovina: (b) of V13 from a case of encephalo-myocarditis; and (c) of T13 from a parrot infected with psittacosis. The last two diseases could be excluded on clinical grounds so that the antigenic relationship with typhus was accepted.

The diffusion of the arteritis appears to have occurred during the 4 months following the initial fulminating morbid incident.

The authors admit that they do not know of any record of rickettsial arteritis which has developed in a manner similar to that observed in the present case. *John W. D. Megaw*

Pollard, M. & Wilson, B. R. **The Prolongation of Murine Typhus Rickettsemia by Cortisone.** *Texas Reports on Biol. & Med.* 1955, v. 13, No. 1, 126–8.

Two groups of rats [numbers not stated] were given a dose of 20 mgm. of cortisone each every 7 days for 6 weeks. After the 2nd dose each rat was inoculated with the Wilmington strain of murine typhus; among 5 rats examined between the 22nd and 28th days after inoculation rickettsiae were recovered from 3. Among 8 untreated control rats inoculated in the same way no rickettsiae were recovered in examinations after the 15th day following inoculation; 3 of these rats were examined between the 15th and 21st days and 5 between the 22nd and 28th days after inoculation.

The authors state that " the prolongation of asymptomatic rickettsemia in rats with cortisone may simulate a physiological means by which the rat may exert a more sustained role in the dissemination of murine typhus through blood sucking ectoparasites ". They mention, however, that Philip and Parker [this *Bulletin*, 1939, v. 36, 466] have found that rickettsaemia

in experimental rodents may last as long as one month after inoculation with murine typhus. *John W. D. Megaw*

Wattenberg, L. W., Elisberg, B. L., Wisseman, C. L., Jr. & Smadel, J. E. **Studies of Rickettsial Toxins. II. Altered Vascular Physiology in Rickettsial Toxemia of Mice.** *J. Immunology.* 1955, Feb., v. 74, No. 2, 147–57, 5 figs. [22 refs.]

This is a description of a study of the effects of intravenous injections of the toxins of *Rickettsia mooseri* on the vascular system of mice. The method adopted was direct continuous observation with the microscope of the blood vessels in a dorsal fold of the skin of an anaesthetized mouse by the transparent-chamber technique developed by Algire and Legallais (*J. National Cancer Inst.*, 1949, v. 10, 225).

For half an hour after the intravenous injection of 4 LD50 of the toxin no change was seen; then there was a slowing of the blood flow followed by vasoconstriction and oedema of the tissues. Death of the mice occurred 1 to 2 hours after the injection.

By using tracer substances of high molecular weight it was shown that leakage of plasma from the vessels occurred throughout most of the tissues of the body. The vascular reactions resembled those observed in mice after severe haemorrhage except that after haemorrhage there is no oedema. "The means by which rickettsial toxin induces this increased permeability [of the blood vessels] remains a matter of conjecture."

The paper is illustrated by a series of 4 photomicrographs which show the changes in the blood vessels and by 8 other photomicrographs, at magnifications of × 120 to × 560, which show histological changes produced in the pancreas, heart, skeletal muscle, kidneys and lungs of the mice.

John W. D. Megaw

Elyan, A. & Dawood, M. M. **A Serological Survey of Q Fever in Egypt.** *J. Egyptian Pub. Health Ass.* 1954, v. 29, No. 6, 185–90.

"1. Complement fixation test with *C. burneti* was used for detecting antibodies in sera of different animal species and in human beings. It has been found that positive reactors were 16% among cows, 13·9% in camels, 10·5% in gamouse, 18·4 in Sudanese cattle and 8·9% in sheep.

"These findings show the endemicity of Q fever in this country and that these animals may act as a source of spread of the disease to human beings.

"The rate of positive reactors, among human beings was 2·6% which is too low as compared to positive reactors among animals.

"2. Complement fixing antibodies to *C. burneti* were demonstrated in the milk of some animals. The percentage of positive reactors was 6%, 10%, and 13·2% in gamouse, sheep and cows respectively. It is suggested that search for C.F. antibodies in animals' milk may be used in surveying a locality for the evidence of Q fever in animals."

[See this *Bulletin*, 1952, v. 49, 1038; 1954, v. 51, 788, 908.]

Rafyi, A. & Maghami, G. Sur la présence de Q Fever en Iran. [**Presence of Q Fever in Iran**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 6, 766–8.

The authors state that there have been few studies of Q fever in Iran, other than the finding of positive serological evidence in a few animals by Giroud and Yassemi [this *Bulletin*, 1952, v. 49, 683].

They have now studied, by means of complement-fixation or agglutination tests for Q fever, the serum of all animals arriving at the Institut Razi, with the following results, a titre of 1/16 being accepted as positive.

	Number	Positive
Dromedaries	12	2
Calves	20	10
Sheep	213	95
Goats	22	8
Total	267	115 (43 per cent.)

Infection was commonest in the western regions of the country.

They also inoculated 70 guineapigs with 530 ticks of 4 species in 34 lots. In some cases a rise of temperature occurred, but no *R. burneti* were isolated.

Negative results followed the inoculation of 16 guineapigs with spleens of 6 rodents (4 *Meriones shawi*, 2 *Nesokia*) and the inoculation of 18 guineapigs with the milk and blood of a few ewes, goats and calves.

The studies continue, but it is evident that the disease exists in Iran and that further research may show the presence of infection in man, which the authors consider to be probable. *H. J. O'D. Burke-Gaffney*

Luoto, L. & Mason, D. M. **An Agglutination Test for Bovine Q Fever performed on Milk Samples.** *J. Immunology.* 1955, Mar., v. 74, No. 3, 222–7, 1 fig.

One of the authors, Luoto, has recently developed a capillary tube agglutination test, employing stained antigen, for detecting antibody against *Coxiella* [*Rickettsia*] *burneti* in bovine serum [see this *Bulletin*, 1954, v. 51, 166]. The present paper contains a description of the application of the test to milk instead of serum. The authors claim that the results with milk are equally reliable and are equal to those obtained with the complement-fixation test. The test is said to be easy and economical; it calls for simple equipment and reagents, a highly trained staff is not needed and the milk samples are easily obtained.

The only drawback mentioned is that with screening tests of milk, undiluted or at low titres, the results are less easy to interpret because they consist, when positive, of colouring of the cream layer by the stained rickettsiae; in similar conditions serum gives visible flocculation. In tests of 663 cows, 610 gave the same results with milk and serum—240 were positive and 370 negative—but 19 were positive with milk and negative with serum, and 34 were positive with serum and negative with milk. Among 100 cows, which had previously given negative reactions and then were vaccinated with a killed suspension of *C. burneti*, discordant results occurred, 96 were positive with the serum test and only 29 with the milk test. The comment on this result is that " the antibody resulting from this vaccination was detected most often and in the highest titers in the serums ". No non-specific reactions occurred either with milk or serum specimens from 199 cows infected or sensitized by other pathogenic agents.

Photographs show examples of positive and negative results with screening tests of undiluted milk and of milk diluted at titres ranging from 1 in 2 to 1 in 256. *John W. D. Megaw*

Weyer, F. Eigenschaften und systematische Stellung der *Rickettsia quintana* mit Bemerkungen zur Systematik und Nomenklatur der Rickettsien. [**The Characteristics and Taxonomy of** *Rickettsia quintana*, **with Remarks on the Classification and Nomenclature of the Rickettsiae**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1955, Apr., v. 6, No. 1, 2–18, 5 figs. [Numerous refs.]

The author begins by discussing the classification and nomenclature of the rickettsiae of human diseases. His valuable contributions to knowledge of these organisms will be familiar to readers of this *Bulletin*, most of whom will probably be relieved to find that in his opinion " some recent proposals to split the group into genera, sub-genera, sub-species seem to cloud the matter more than to clarify it ". Among other proposals for revision of the classification and nomenclature of the *Rickettsiaceae* he quotes that of Philip [see this *Bulletin*, 1943, v. 40, 828]. The chief changes of name necessitated by acceptance of this proposal are: *Rickettsia mooseri* to *R. typhi*; *R. rickettsi* to *Dermacentroxenus rickettsi* and *R. burneti* to *Coxiella burneti*. Some of the other proposals for revision of the nomenclature are even more drastic, and the author states that for practical reasons most observers agree in the use of the generic name *Rickettsia* for all the rickettsiae of human diseases. The rest of the paper consists of a very useful summary of the discoveries made by the author in his studies of *Rickettsia quintana* which he thinks may deserve a separate place among the Rickettsiaceae because of its habit of extracellular growth in the stomach of the human louse and because of its strict adaptation to this louse whereas the other rickettsiae can multiply in several different arthropods. For these reasons some workers consider *R. quintana* to have a doubtful claim to being a true rickettsia, but the author points out that some intracellular rickettsiae have been found capable of multiplying extracellularly in the haemolymph of lice in experimental conditions and that *R. quintana* has been found developing in simian lice, an observation which complements the discovery that trench fever is transmissible to rhesus monkeys.

John W. D. Mcgaw

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

See also p. 943, Afrique Occidentale Française, Rapport sur le fonctionnement technique de l'Institut Pasteur de l'Afrique Occidentale Française en 1953. [**Technical Report of the Pasteur Institute in French West Africa in 1953**]

Anderson, C. R., Spence, L. & Downs, W. G. **Report of a Case of Yellow Fever in Trinidad, B.W.I.** *Caribbean Med. J.* 1954, v. 16, Nos. 3/4, 68–70.

The English summary appended to the paper is as follows:—

" (1) The case history and laboratory findings of a case of yellow fever in a human in Trinidad, B.W.I., are presented.

" (2) This is the first confirmed human case of yellow fever to be reported in Trinidad, B.W.I., since 1914."

LUMSDEN, W. H. R. **Entomological Studies, relating to Yellow Fever Epidemiology, at Gede and Taveta, Kenya.** *Bull. Entom. Res.* 1955, Apr., v. 46, Pt. 1, 149–83, 6 figs. [Numerous refs.]

In an area of tropical rain forest with no pronounced dry season, it is not difficult to suppose that the yellow-fever cycle may be maintained by transmission from monkey to monkey by an appropriate mosquito. Such a cycle of events probably takes place in Bwamba in Western Uganda, the principal vector there being *Aëdes africanus*, adults of which are present at all times of the year [this *Bulletin*, 1952, v. 49, 502]. But the epidemiology of yellow fever is much more difficult to understand in an area with a prolonged dry season during which adult mosquitoes may become very rare, particularly those which breed in rot holes and such places, among which the vectors of yellow fever are generally to be looked for [*ibid.*, 1951, v. 48, 1102]. Under these circumstances transmission by mosquito from mammal to mammal appears to be impossible in the dry season. It is in such areas, including the two places studied in the present paper, that much work is concentrated at the moment in order to define the mechanism by which the virus persists or is perhaps introduced from time to time.

In the present paper an account is given of work carried out at Gede on the Kenya coast at the end of the dry season, and at Taveta in Kenya, close to the Kilimanjaro area of Tanganyika, in the main wet season. [There are some disadvantages (at least to the reader), in presenting these two studies in one paper, and we find it a little difficult to switch from the one area to the other, giving first the meteorology of each, then the vegetation, then the mosquito findings and so forth.]

The paper describes in a condensed manner an immense amount of work on biting insects, particularly the mosquitoes. Adults were caught by 24-hour catches and by moving about in the woodland, and considerable numbers of larval collections were made from which many species of mosquito were bred: trap breeding places were set out.

The author discusses these entomological results in relation to the general epidemiology of yellow fever in Kenya. He has not found a way of escaping from the horns of the dilemma: on the one side virus circulates only for a brief period in the wild mammal hosts; on the other, virus is present in the infected mosquito for the rest of its life, but transmission through the ovaries, which has been adequately searched for in *Aëdes aegypti* and *africanus*, has not been shown to occur: as these two species are highly effective vectors it is felt that other species of mosquitoes are probably unable to transmit virus to the next generation. Where then is the virus in the dry season? Much careful work and thought having proved fruitless, it is suggested that the next step is to give much further study to the biology and ectoparasites of the *Galago*. It will be remembered that HADDOW showed [this *Bulletin*, 1953, v. 50, 106] that these lemurs may be more involved in the epidemiology of sylvan yellow fever than the monkeys are.

P. A. Buxton

DENGUE AND ALLIED FEVERS

Cluzel & Desnues. Étude épidémiologique préliminaire d'une fièvre exanthématique bénigne dans les établissements de la Marine à Saïgon. [**A Preliminary Epidemiological Study of a Benign Exanthematic Fever in the Naval Establishment at Saigon**] *Rev. Méd. Nav.* (*Métropole et Outre-Mer*). Paris. 1955, v. 10, No. 1, 7–20.

This is a study of the epidemiology of the fever described recently by Cluzel and Roux as "A New Rickettsial Disease; Urban Exanthematic Fever of Saigon" [see this *Bulletin*, 1954, v. 41, 910]. The reviewer's opinion was that the clinical and epidemiological description was entirely consistent with the diagnosis of dengue, and surprise was expressed that a preliminary report stated that in 28 of the 40 sera tested there were positive reactions as "satisfactory titres with sero-diagnostic and complement-fixation tests for boutonneuse fever". The succinct clinical description of the disease in the present paper is equally suggestive of dengue. Knowledge of the epidemiology of the disease is said to be still insufficient and the "positive proofs" that the cause is a rickettsia are stated to be as follows:— "(1) Rickettsial sero-agglutination tests at the Pasteur Institutes of Saigon and Paris have frequently been positive. On the other hand the Weil-Felix reaction has been positive only in exceptional cases. (2) Sero-agglutination tests for boutonneuse fever and epidemic typhus are positive at rather low titres. These positive reactions suffice to eliminate murine typhus with which the disease had been confused at first. (3) Till there is proof to the contrary we can classify the disease in the pseudo-typhus group" [abstracter's translation].

No other information is given with regard to the laboratory findings but investigations are said to be proceeding. In the meantime preventive measures are being directed especially to rat control, the assumption being that the reservoir of infection is the rat, from which transmission by contamination of food is considered more probable than insect transmission.

John W. D. Megaw

See also p. 937, Halcrow, **Notes on a Laboratory Colony of** *Aedes* (*Stegomyia*) *albopictus* **(Skuse) and its Distribution in Mauritius.** *Proc. Roy. Entom. Soc. of London.* Ser. A. 1955, Mar. 25, v. 30, Pts. 1/3, 40–42.

Sabin, A. B. **Recent Advances in our Knowledge of Dengue and Sandfly Fever.** *Amer. J. Trop. Med. & Hyg.* 1955, Mar., v. 4, No. 2, 198–207. [22 refs.]

Most of the recent advances in knowledge of dengue and sandfly fever which are described in this Charles Franklin Craig lecture have resulted from the extensive and intensive research of the author. References are given to 17 articles of which 8 were written by him as sole author, and the remaining 9 were written in collaboration with other workers. The present paper contains a very useful summary of the whole of this work, which has been published since 1942, but it deals specially with the 10 papers which have appeared in and after the year 1952. References to the studies by the author before 1952 will be found in this *Bulletin*, 1952, v. 49, 504 and 686.

The two types of human dengue virus may produce only homotypic neutralizing antibodies in infected mice but heterotypic complement-fixing antibodies. The complement-fixation tests show a relationship between the

viruses of dengue, yellow fever, West Nile fever and Japanese B encephalitis. This relationship is not associated with any significant cross-immunity; for example, persons immunized against the 17-D strain of yellow-fever virus showed no resistance to even small amounts of dengue virus.

Type I dengue virus from the 7th mouse passage onwards became modified so that it no longer produced febrile dengue in human volunteers, though it still produced a rash and solid immunity against the unmodified virus of the same type, but not against Type II virus.

Type I virus of later mouse passages was found occasionally to cause paralysis in monkeys after intracerebral inoculation; this paralysis was indistinguishable from poliomyelitis. In recent experiments it was found that virus of the 118th mouse passage produced paralysis in 5 out of 15 monkeys inoculated with relatively small doses, but in only 1 of 15 monkeys given much larger doses; it was therefore concluded that the paralysis-producing strain was a true mutant and that the effect was not due to the high concentration of the virus.

An 18th mouse passage of Type II virus was tested on 4 human volunteers; it produced no symptoms, except a rash; all the patients developed homotypic neutralizing antibodies and 3 of them also developed heterotypic antibodies, though at a lower titre. The 18th passage virus, after several additional passages through mice, was inoculated into numerous monkeys, none of which developed paralysis, and it was therefore concluded that the relatively early passages appeared to have enough " genetic stability " to justify their use as protective vaccines, though it would be necessary to test each batch by intracerebral inoculation of at least 10 monkeys with different amounts of the virus.

Type II virus failed to multiply in chick embryos and Type I multiplied only to a slight degree; both types multiplied to a very moderate degree in tissue cultures prepared from monkey kidneys.

Reference is made to the haemagglutinin test recently described by Sweet and the author [see *ibid.*, 1955, v. 52, 356].

One of the chief recent advances in knowledge of sandfly fever is the demonstration that there are 2 immunologically distinct strains of the virus, the " Naples " and the " Sicilian " and that each of these can be adapted by repeated intracerebral passage in new-born mice to a condition of full pathogenicity for adult mice by intracerebral inoculation. Cross-immunity and other tests show a complete lack of immunological relationship between the two strains, yet each of them when mouse-adapted showed loss of virulence for human beings, while still retaining their homotypic immunizing properties.

The haemagglutination and complement-fixation tests did not give satisfactory results in attempts to use them for diagnosis.

The author states that " dengue fever and sandfly fever do not have very much in common. They are endemic in different parts of the world, they are transmitted by different vectors and are caused by totally different and unrelated viruses ".

[This statement will surprise some readers. The two viruses can be regarded as being related to each other in causing diseases which are transmitted from man to man by insects and are of the same general type; indeed many individual cases of the two diseases resemble one another so closely that they cannot be differentiated by clinical observation or by any of the generally available laboratory methods. The author himself has shown that the virus of sandfly fever resembles the virus of dengue in being transmissible by the intracerebral route through new-born mice and, after several passages through these, of being readily transmitted through adult mice in

the same way. The absence of cross-immunity between the diseases in mice or men is the strongest reason for regarding them as being unrelated, but this reason is not final and conclusive now that the author has shown that the Naples and Sicilian strains of sandfly fever virus show a complete absence of immunological relationship to each other.]

John W. D. Megaw

RABIES

Paarmann, E. Ein Beitrag zur Lyssa der Vögel. [**Rabies in Birds**] *Ztschr. f. Hyg. u. Infektionskr.* 1955, v. 141, No. 2, 103–9, 1 fig. [14 refs.]

The present epidemic of rabies in Germany has focussed attention on this infection, and this paper gives an account of the results of examination in the veterinary institute at Detmold of 44 wild and domestic birds, some alive and some dead, for evidence of rabies. Positive evidence of infection was found by animal inoculation in 25 of these birds, but direct microscopical examination revealed Negri bodies in the brain in only 2 of these (in 1 other bird Negri bodies were seen but animal inoculation appears not to have been carried out). Positive results were obtained in duck (1), geese (2), hens (11), buzzards (4), magpie (1), kite (1), hawks (3), crow (1), owl (1), and sparrow (1). It is pointed out that the demonstration of Negri bodies in positive cases is rare in birds when compared with the results which were obtained in the examination of 952 animals dead of rabies, in which 55 per cent. were Negri-positive. This observation and also the possible modes of infection in birds are discussed. No proven instance of the transmission of rabies from bird to man has as yet been recorded.

M. E. Delafield

Coonoor. Pasteur Institute of Southern India [Veeraraghavan, N., Director]. **Rabies and its Prevention with Detailed Instructions for the Guidance of Medical and Veterinary Officers Responsible for the Administration of Antirabic Treatment.** pp. vi + 48, 1 chart. 1955. Madras: Diocesan Press.

The object of this publication—a revised and up to date edition of the pamphlet entitled " Rabies and its Prevention " by Col. H. W. Mulligan, a former Director of the Pasteur Institute, Coonoor—is to make available to medical and veterinary officers responsible for the administration of antirabies treatment sufficient information about rabies to enable them to acquire a reasonable working knowledge of that disease. In addition to general information on the aetiology, mode of transmission, symptoms and diagnosis of rabies, details are given regarding the classification of patients exposed to the risk of rabies infection, the methods advocated for the administration of antirabies vaccine and other therapy, the reactions complicating antirabies treatment, rabies in dogs and other animals, the treatment of neuroparalytic accidents, and the collection and recording of statistical data in relation to antirabies treatment. The subject-matter is dealt with in a clear, concise and highly informative manner and the object of the pamphlet is fully attained.

Items of particular interest recorded in the text include: (a) in Southern India complete decentralization of treatment has been made possible since

1939 by the despatch from the Institute at Coonoor of 5 per cent. phenolized sheep's brain-tissue virus-vaccine (Semple type) to selected centres, dispensaries and hospitals, as well as to registered medical practitioners for the treatment of their private patients; (b) during the period 1933–53 the mortality rate among over 200,000 persons after complete treatment with 5 per cent. Semple-type vaccine at the Institute and its subsidiary centres was 0·12 per cent.; (c) during the same period among 279,018 persons treated only 13, or 1 in 21,463 developed neuroparalytic accidents; and (d) for the treatment and prophylaxis of dogs, irrespective of breed and age, the daily injection of 5 cc. of 5 per cent. vaccine for 7 consecutive days is recommended yearly. *G. Stuart*

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

Ehrenkranz, N. J. & Meyer, K. F. **Studies on Immunization against Plague. VIII. Study of Three Immunizing Preparations in protecting Primates against Pneumonic Plague.** *J. Infect. Dis.* 1955, Mar.–Apr., v. 96, No. 2, 138–44.

The authors describe methods of successful immunization of *Macacus rhesus* monkeys against pneumonic plague resulting from the intratracheal inoculation of 10,000 cells of virulent *Pasteurella pestis*, a dose which killed 17 monkeys, unprotected by vaccination, within an average time of 5 days, and always within 7 days.

The vaccines tested were:—(1) the living avirulent strain, E.V.76 of *P. pestis*; (2) formalin-killed virulent *P. pestis* vaccine; and (3) capsular fraction I of virulent *P. pestis*. None of these vaccines gave satisfactory protection when administered according to the dosage schedules recommended for antiplague immunization. With massive doses given over periods of 10–16 days better results were obtained, but protection was still incomplete. With a long-term massive dosage system, in which the doses were spread out over periods of 45–92 days and 3–9 booster doses were given, there were no fatalities among 15 immunized monkeys challenged in the usual way, though one of the 4 monkeys immunized with strain E.V.76 developed pneumonia and recovered.

An interesting finding was that a total dose of only 5·5 mgm. of fraction I spread over 170 days, with 4 booster doses, completely protected all the 4 monkeys tested, whereas a much larger quantity of the fraction (18 mgm.); given over 11 days, saved only 1 out of 4 monkeys from death. It was concluded that repeated vaccinations, spread over a long period, were much more effective than massive doses given over a short period. It was also concluded that a vaccine to be effective must provide fraction I in adequate amounts; either it must be already available as in the killed vaccines, or, if living vaccines are used, these must be able to produce the fraction *in vivo*.

In the course of the numerous experiments it was found that only one monkey showing 2 out of the following 3 antibody levels at the time of challenge failed to survive:—(1) complement fixation titre 1 in 4 or over,

(2) agglutination titre 1 in 16 or over, and (3) mouse-protection index 9 or less. It was found, however, that monkeys showing little evidence of antibody measurable by these tests not infrequently survived challenge; this was specially true of those immunized with E.V.76 vaccine.

John W. D. Megaw

Payne, F. E., Larson, A., Walker, D. L., Foster, L. & Meyer, K. F. **Studies on Immunization against Plague. IX. The Effect of Cortisone on Mouse Resistance to Attenuated Strains of** *Pasteurella pestis*. *J. Infect. Dis.* 1955, Mar.–Apr., v. 96, No. 2, 168–73. [21 refs.]

Each of 60 mice was given an injection of 2·5 mgm. of cortisone and, 4 hours later, was inoculated intraperitoneally with a measured dose of the living avirulent strain E.V.76 of *Pasteurella pestis*. Only 5 of the mice survived, whereas there was only 1 death among 60 control mice which were inoculated with the same doses of E.V.76 but had not been given cortisone. Among 20 mice which received 2·5 mgm. of cortisone not followed by inoculation with E.V.76 there were 2 deaths.

Three other avirulent strains of *P. pestis* were employed in similar tests; with one of them cortisone injections were followed by a pronounced increase in the fatality rate among the mice but with the other 2, which were the A 1122 and the Tjiwidej strains, the drug caused no increase in the mortality rate; these 2 strains are known to have little capacity for survival in normal mice [this *Bulletin*, 1953, v. 50, 623].

Previous treatment with cortisone did not increase, but rather tended to diminish, the susceptibility of mice to the lethal action of the lysed toxins of *P. pestis*.

Mice previously immunized, either actively or passively, against *P. pestis*, were found to be protected against the adverse influence of cortisone given before challenge with strain E.V.76. Pathological changes in the mice which died are discussed.

John W. D. Megaw

Chen, T. H. & Meyer, K. F. **Studies on Immunization against Plague. XI. A Study of the Immunogenicity and Toxicity of Eleven Avirulent Variants of Virulent Strains of** *Pasteurella pestis*. *J. Infect. Dis.* 1955, Mar.–Apr., v. 96, No. 2, 145–51. [24 refs.]

In attempts to isolate avirulent strains of *Pasteurella pestis* from 27 old cultures, which had been preserved for 3 to 11 years, the authors succeeded in isolating 11 avirulent variants by the "single colony picking" method. One of these variants was not completely avirulent. The table shows the salient features of the results of the experiments.

Original Cultures Media in which preserved	Number	Duration of storage (in years)	Number of avirulent strains isolated	
Hormone agar	5	5–11	5	
Hormone agar	2	3	0	
Blood-agar slope cultures	11	4–10	3	(From cultures aged
Agar stab cultures	9	4½	3	4½–6½ years)

The incompletely virulent strain was highly protective to mice; and among the 10 fully avirulent strains there were 2 which were highly protective and

which seemed likely to prove quite as effective as the standard E.V. 76 and Tjiwidej avirulent strains for general use as living antiplague vaccines. Among the remaining 8 fully avirulent strains 4 were moderately protective to mice and 4 gave no protection.

Of the 2 highly protective and fully avirulent strains one was found to be the most toxic, and the other the least toxic, of the 11 strains, so that there seemed to be no relationship between toxicity and immunogenicity: both of these strains were found by various tests to contain relatively high proportions of " fraction I ". *John W. D. Megaw*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

Simitch, T., Petrovitch, Z. & Chibalitch, D. La longévité des kystes d'*Entamoeba dysenteriae* dans les denrées alimentaires. [**Viability of Cysts of *Entamoeba histolytica* in Foodstuffs**] *Arch. Inst. Pasteur d'Algérie.* 1954, Dec., v. 32, No. 4, 305–8.

In order to determine the rôle of food contamination in the transmission of amoebiasis, the authors carried out experiments on the viability of cysts of *Entamoeba histolytica* when placed on foodstuffs and kept (1) at 20°–25°C. in the case of ham, salami sausage, lard, butter, cheese, pastry, bread, lettuce, strawberries and cherries, and (2) in the refrigerator (4°C.) in the case of yoghourt, milk and local lemonade (" bosa "). The results were assessed by cultivation on Löffler-serum medium. Amoebic growth in cultures was obtained in the 1st group after contact with the food for periods from 15 to 74 hours, and in the 2nd group after 11 to 15 days.

It is concluded that foodstuffs exposed to contamination by amoebic cysts may be a source of human infection, transmission being effected directly by foodhandlers or indirectly through flies. *C. A. Hoare*

Scheel, M. Erfahrungen mit Resotren in einer Praxis in Indien. [**Use of Resotren in Practice in India**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1955, Apr., v. 6, No. 1, 119–21.

The English summary appended to the paper is as follows:—

" Resotren was used against amebiasis in a mission hospital in India. A total of 58 tablets was given within 25 days. For intra- as well as extraintestinal amebiasis, results were highly satisfying, and the author considers resotren a progress in therapeutics. Three cases are reported in detail."

Thompson, P. E., Reinertson, J. W., Bayles, Anita, McCarthy, D. A. & Elslager, E. F. **Antiamebic Action of 5-Chloro-7-Diethylaminomethyl-8-Quinolinol and of other Substituted 8-Quinolinols *in Vitro* and in Experimental Animals.** *Amer. J. Trop. Med. & Hyg.* 1955, Mar., v. 4, No. 2, 224–48. [43 refs.]

The present method of search for amoebicidal drugs is purely empirical and consists of testing as many compounds as possible and examining

systematically chemical series of a type that has yielded promising drugs. The present report deals with a number of substituted 8-quinolinols in view of the therapeutic virtues of Chiniofon, Vioform and Diodoquin.

Tests were made *in vitro* on cultures of *Entamoeba histolytica* under conditions which are detailed in the text of the paper. A standardized procedure for testing the drug *in vivo* in rats, in dogs and in hamsters, was also adopted and the details of this should also be sought in the original [see also this *Bulletin*, 1949, v. 46, 1036; 1950, v. 47, 741; 1952, v. 49, 511]. Of 98 compounds studied every one was tested *in vitro*, 63 in rat intestinal infections, 14 in dog intestinal infections, and 4 in hamster liver infections. The details are set out in tables, which also show the graphic formulae of the compounds. The conclusions the authors reach are as follows:—

"Many of the compounds were effective *in vitro* and against intestinal infections, but none of those tested against hepatic infections was encouragingly effective in nontoxic doses. Consideration of the manifest structure-activity relationships showed that activity was associated with a wide variety of substituents, particularly in the 5-, 6- or 7-position of the 8-quinolinol nucleus. Many of the active compounds did not contain iodine, thus casting doubt on the existing theory that iodine *per se* is responsible for the activity of the various iodinated-8-quinolinols in clinical use as amoebicides.

"Although most of the compounds were less active *in vitro* in the presence of gastric mucin than in its absence, many of them still were active *in vivo*. Therefore, susceptibility to mucin binding alone does not appear to be an adequate basis for rejecting compounds at the *in vitro* level. Good correlation was observed between high activity *in vitro* and therapeutic effect *in vivo*.

"5-Chloro-7-diethylaminomethyl-8-quinolinol proved to be one of the most promising compounds. Its chemotherapeutic effects and toxicity in several species of animals are described, and a few observations are presented on its physiological disposition in animals." *A. R. D. Adams*

Fejgin, A. K. [**Treatment of Balantidiosis with Aminarsone**] *Med. Parasit. & Parasitic. Dis.* Moscow. 1955, v. 24, No. 1, 81. [In Russian.]

The author reports that among 14 patients suffering from balantidiosis, who were treated with emetine, Yatren, Acriquine [=mepacrine] and Disulphane [=sulphanilylsulphanilamide], 3 relapsed, whereas no relapses occurred in 17 patients treated with Aminarsone [=Atoxyl] (0·25 gm. twice daily for 10 days, followed by an interval of 10 days, after which the course was repeated). *C. A. Hoare*

RELAPSING FEVER AND OTHER SPIROCHAETOSES

Baltazard, M., Bahmanyar, M. & Chamsa, M. Sur l'usage du cobaye pour la différenciation des spirochètes récurrents. Individualité du groupe *B. crocidurae*. [**The Use of Guineapigs for the Differentiation of Relapsing Fever Spirochaetes. Individuality of the Group** *B. crocidurae*] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 6, 864–77. [30 refs.]

The authors summarize previous work on the subject and then give the results of a comparative study of the results of inoculating guineapigs with

S. duttoni and *S. crocidurae*, respectively. Five strains of *S. duttoni* were inoculated into 12 adult guineapigs and these animals never showed any sign of spirochaetes. The inoculation of *S. crocidurae* into guineapigs also rarely produced any infection detected by ordinary dark ground examination —only 6 out of 119 were positive—but later, by the use of stained thick drops and prolonged examination, the authors were able to detect rare spirochaetes in animals that had been considered negative [this *Bulletin*, 1955, v. 52, 49]. When new-born guineapigs were used, however, there was a marked difference in the results obtained, for the inoculation of *S. duttoni* never produced any signs of infection, while when 92 new-born or young guineapigs were inoculated with comparable doses of various strains of *S. crocidurae*, they showed numerous spirochaetes in the blood.

The authors then discuss some of the discordant results previously recorded and point out the very doubtful origin of many of the laboratory strains which have been labelled *S. duttoni*, and state that every author who has used an unquestionable strain of this spirochaete maintained in *Ornithodorus moubata* is in agreement as to the non-receptivity of the guineapig.

A table is included showing the various species of relapsing fever spirochaetes studied by the authors and the results of their inoculation into adult and new-born guineapigs.

Species	Adult guineapig	New-born guineapig
S. hispanica *S. persica*	Heavy infection of long duration	Massive infection
S. turicatae *S. hermsi* *S. parkeri*	Moderate infection	Heavy infection of long duration
S. crocidurae	Very slight infection usually " occult "	Moderate infection
S. latychevii	Negative	Very slight infection usually " occult "
S. duttoni	Negative	Negative

Edward Hindle

Baltazard, M., Chamsa, M. & Seydian, B. L'infection " occulte " dans les spirochétoses. [**" Occult Infection in Spirochaetoses**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 6, 878–85.

The authors give the results of further experiments with various strains of relapsing fever spirochaetes which support the view previously advanced by Burgdorfer and Baltazard [see this *Bulletin*, 1955, v. 52, 49] that whenever the blood of any animal is proved to be infective, it contains actual spirochaetes, although these may be present in such very small numbers as to be detectable only by prolonged examination of stained thick drops. Previously, actual spirochaetes were often supposed to be absent in these cases, and the term " inapparent " infection was sometimes applied, but the authors consider that it is preferable to use the term " occult " infection as in their opinion spirochaetes can always be found by sufficiently long and careful examination. *Edward Hindle*

Davis, G. E. & Burgdorfer, W. **Relapsing Fever Spirochetes: an Aberrant Strain of *Borrelia parkeri* from Oregon.** *Exper. Parasit.* New York. 1955, Mar., v. 4, No. 2, 100–106.

Blanc, G. & Bruneau, J. Les crapauds sur lesquels se gorgent les ornithodores, *O. erraticus*, de la grande variété jouent-ils un rôle dans la répartition de ces acariens et dans leur pouvoir infectant. [**Do Toads, on which the Large Variety of *Ornithodorus erraticus* feed, play any Part in the Distribution of these Ticks and in their Infective Properties?**] *Maroc Méd.* 1954, June, v. 33, No. 349, 596–7.

Two varieties of *Ornithodorus erraticus* have been described from Morocco, a large variety widely distributed in the Eastern regions, especially in humid country, and a small variety found in the desert region of South Morocco, although the two varieties co-exist in a zone between Mogador, Marrakech and Inezgane. Specimens of the large variety collected near the coast are almost invariably infected with *Spirochaeta hispanica*, while the small variety is never found infected with this spirochaete, and also, in the laboratory, is unable to transmit the infection. On the other hand it transmits *S. merionesi*, which seems to be related to *S. duttoni* as it is pathogenic to rats, but not guineapigs.

The large variety of *O. erraticus* disappears from burrows in the dry zones but in the neighbourhood of Marrakech the authors have found large numbers of fully gorged specimens under stones or similar localities in the absence of any burrows. The only animal on which they could feed would seem to be the common toad of that region, *Bufo mauritanicus*. The authors reared examples of both varieties of *O. erraticus* not only on this toad but also on *B. viridis* and found that all stages of the tick including newly hatched larvae readily fed on them. A strain of ticks nourished exclusively on toads gradually lost its infection with *S. hispanica*, while a similar strain of ticks fed on rodents remained infected. *Edward Hindle*

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

McFadzean, J. A. & McCourt, J. F. **Leprosy in Gambia, West Africa.** *Leprosy Review.* 1955, Apr., v. 26, No. 2, 57–64, 1 map & 1 graph.

Gambia is a 300-mile-long strip of territory in West Africa, some 10 miles broad on an average, lying on both sides of the Gambia river. It has a population of 261,564, which consists of 5 main tribes. In the 4 divisions of the Protectorate 15 villages were surveyed for leprosy, each containing about 400 to 500 inhabitants and, as far as possible, each of the principal tribes being represented in a village of each division. The village incidence varied from 1 to 3·9 per cent., and the divisional incidence from 1·4 to 3·1 per cent. From this it is calculated that there are approximately 6,000 people in the Protectorate suffering from leprosy, of whom 1,500 (26·6 per cent.) approximately have the lepromatous infectious type. The total

incidence was found to be 2·4 per cent., approximating to the figure of 2·5 per cent. found by Ross in 1947. Both surveys showed largely that the further one proceeded up the river the higher was the incidence. As the incidence of tuberculosis is increasing in the Gambia it is suggested that BCG might possibly be of use in the control of both diseases, especially as there would be considerable opposition to isolation of infectious patients.

Ernest Muir

Brown, J. A. K. **The Incidence and Epidemiology of Leprosy in Uganda.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, May, v. 49, No. 3, 241–52, 1 chart.

Uganda, with a population of about 5 million and an area of 93,981 square miles, of which a seventh is open water, is divided into Eastern, Western and Northern Provinces with the kingdom of Buganda in the centre. These are subdivided into Districts, Counties, Sub-counties and rural Parishes.

As there are no towns or villages, surveys were made at the parish or sub-county level. Help in enumeration and in gathering the people together for examination was given by the chiefs and the local medical and other officials. Sometimes numbers of local populations could be obtained from previous sleeping sickness registers. In tabular form the results of 36 sample surveys are given, divided under the 4 main divisions of the country. The subjects with leprosy are divided according to age, sex, and type of disease.

Because of its varying climatic conditions Uganda is considered a particularly suitable country for studying the effect of climate on the incidence of leprosy. The surveys showed that " atmospheric humidity, temperature and nearness to water did not appear to have any relationship to incidence ", and there was no correlation between incidence and population density. The proportions between sexes were almost equal. Among 882 subjects, 19 per cent. were under 15, 32 per cent. between 15 and 30, and 31 per cent. between 30 and 45. The surveys showed a series of incidence values from 0·0 to 4·1 per cent.

It is concluded that " the social structure determines the age of onset, the age frequency and the disease pattern. Clinical leprosy develops in susceptible persons after contact with a patient. Susceptibility is fundamental. The infective agent may be a tuberculoid case. Susceptibility is inherited and may be transmitted through successive generations without the appearance of clinical leprosy. Variations in incidence are due to those factors which influence the number of susceptibles and their opportunities for contact ".

The suggestion that leprosy may be spread by tuberculoid cases is argued as follows. " The infecting patient is usually thought to be the lepromatous case. Where the lepromatous rate is 20 per cent. it may be difficult to find a village without at least one. The inference then may appear legitimate. With a lepromatous rate of 10 per cent., the same incidence and similar living conditions, difficulties arise. A lower lepromatous rate implies a higher general level of resistance. It is not easy to understand why the greater the resistance the greater should be the potentialities of fewer lepromatous cases. The more intimate communal life may be sufficient explanation in a compound or a village but not under the different conditions of East Africa. There are parishes of 1,000 people dispersed over 20 sq. miles without a single lepromatous case, and tuberculoid cases occur five miles or more from the nearest lepromatous patient. It would require

the greatest mobility and popularity on the part of the lepromatous subjects if all the leprosy in the country could be attributed to them. Open cases could act as the only source of infection in Uganda on the assumption of carriers, an assumption less easy to accept than that tuberculoid cases are infectious. Admitted that lepromatous cases more easily infect and that intimate contact increases the risk, for susceptible people contact with a tuberculoid patient may be sufficient to decide the issue."

[This would imply that tuberculoid cases could infect considerable numbers of those with considerable resistance as shown by their tuberculoid type, a very serious implication. This matter is one of importance and requires careful further study. The paper is of much interest, and deserves to be studied in the original.] *Ernest Muir*

Davey, T. F. **The Effect of treating Lepromin with Lepromatous Serum.** *Leprosy Review.* 1955, Apr., v. 26, No. 2, 65–71.

A controlled experiment is described which was undertaken to test the findings of Ridley [see this *Bulletin*, 1955, v. 52, 53] that the serum of patients with lepromatous leprosy may inactivate lepromin.

Serum from 12 such patients was added to lepromin and after 1½ hours' incubation at 37°C. and keeping overnight in the refrigerator, was inoculated in 60 recipients each of whom received 5 injections: lepromin plus a test serum, lepromin plus another test serum, lepromin plus saline, lepromin plus lepromin-negative serum of a healthy person, lepromin plus lepromin-positive serum of a healthy person. When the reaction of the lepromin-saline mixture was used as a basis of comparison, out of 120 tests with lepromatous serum, 111 conformed to the normal, and of the 9 deviating results, all of which were small in degree, only 3 exhibited diminution in response. Of the 120 control tests with normal serum, 96 gave normal results, 22 showed enhancement, and 2 diminution. All the evidence suggests that deviations were non-specific in character. *Ernest Muir*

Gehr, E. Orthopädische Behandlung bei Lepra. [**Orthopaedic Treatment of Leprosy**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1955, Apr., v. 6, No. 1, 116–18, 4 figs.

The English summary appended to the paper is as follows.—

"Orthopedic treatment of leprous patients, also massage and physical exercises, are necessary to prevent paresis, atrophy and contraction, especially in arrested cases. If trained personnel is not available in the leper home, some intelligent patient should be taught to aid and direct his fellow-sufferers. The author reports a practical example of this kind of service in Suriname."

Brown, J. A. K. **Leprosy Control in Uganda.** *Corona.* 1954, Dec., v. 6, No. 12, 459–62. [Reprinted in *Leprosy Review.* 1955, Apr., v. 26, No. 2, 72–6.]

The author, drawing on his previous experience of leprosy control in Nigeria, set out to plan a campaign against leprosy in Uganda. In the two countries, however, the conditions were very different and called for different methods of handling. In Nigeria there was a natural tendency for small leprosy communities to spring up. "It appeared reasonable to weave this

natural thread into an organized scheme of control based on provincial settlements, using volunteers and ex-patients to survey outlying parts and to encourage the formation of similar communities under the guidance of the local chiefs.'' But Uganda is quite unlike Nigeria, the houses are widely scattered, '' a natural barrier to the spread of epidemics but a disadvantage to the provision of rural medical service ''. It is probably this scattering which makes the incidence of leprosy less than in Nigeria, but there is most leprosy where the population is most dense, and it is in these areas that it is most difficult to get land for leprosy settlements.

The population of Uganda is more than 5 million, and it is calculated that there are 80,000 people with leprosy, for whom there is accommodation for only 2,500 in leprosaria. Advantage was taken of the fact that these leprosaria had attracted squatters into their environment '' to link it to a community effort throughout the country to establish nationwide treatment and control ''. As patients are not able to travel long distances to appear regularly for treatment, '' small treatment villages make continuity possible and secure some measure of segregation ''. The patients are allowed, however, to go home at intervals, and this insures that they get food and are kept in touch with their families. It is not considered wise under the circumstances to attempt segregation of all patients. Much of the organization of leprosy control is to safeguard '' people from their own folly or ignorance, through which they may omit to take the drug regularly, or take overdoses, or give or sell it to their friends ''.

The article finishes with an account of the progress of establishing these village settlements in the various provinces; some 18 have already been begun, and more are on the way. *Ernest Muir*

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—Trematodes (*schistosomes, other flukes*); Cestodes (*Diphyllobothrium, Taenia, Echinococcus, other cestodes*); Nematodes (*Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.*).

McCullough, F. S. **Observations on *Schistosoma haematobium* Infection and on the Vector Snails at Tema in the Gold Coast.** *West African Med. J.* 1955, Mar., v. 4 (n.s.), No. 1, 18–24, 1 map. [11 refs.]

'' (1) Data on the incidence of *Schistosoma haematobium* and on the distribution of its snail host, *Physopsis africana*, are described at Tema, an area in the Gold Coast where extensive development projects are being planned.

'' (2) While the snail hosts are widespread in the area, the incidence of *S. haematobium* in children is low. The probable explanation is that the sources of potential transmission are situated mainly in sparsely populated localities and at present are infrequently used.

'' (3) The distribution of *Bulinus* (*Pyrgophysa*) *forskalii* is also recorded. On the basis of laboratory-controlled transmission experiments and on the results of observations made in the field it is considered that the local form of this species is not an effective vector of *S. haematobium* infection in the Tema area.''

El-Gindy, M. S. **Incidence of *Schistosoma mansoni* in the Vector Snail, *Planorbis boissyi*.** *J. Egyptian Med. Ass.* 1954, v. 37, Nos. 11/12, 1259–71. [10 refs.]

Collections of *Planorbis boissyi* were made monthly, January to December 1953, from a ditch 700 metres long by 3 metres wide, 1 metre (maximum) depth, near a village in Egypt known to be heavily infected with *S. mansoni*, in order to study seasonal incidence of infection and the factors influencing it. During the winter closure the drain was dry from the 20th January to the 20th February. The percentage rate of infection and (in parentheses) number of snails examined each month were as follows: 0·1 (1,176), 0 (615), 0 (1,085), 0·2 (2,350), 10·8 (585), 11·2 (558), 3 (1,227), 11·5 (513), 9 (646), 8·6 (706), 2·1 (3,359), 0·7 (2,244). The average water temperature (°C.) of the Nile at 8 a.m. rose from 14·4 in January to a maximum of 28·1 in August and then fell to 14 in December.

"The seasonal variation in the infection rate of *P. boissyi* with *S. mansoni* is the outcome of the effect of the above factors on the incidence of infection. The scarcity of infected snails in winter is due to low temperature, dryness of drains in the winter water closure period, predominance of young snails, and less liability to pollution of water with human excreta.

"With the coming of spring, man usually frequents water and starts the pollution of water, resulting in the infection of snails which does not show until the middle of April due to mild temperature. An abrupt rise in the infection rate by the onset of spring is the result of ripening, due to the increase in temperature, of all the infections started after the winter closure period.

"The high percentage of infected snails extends in summer due to high temperature resulting in quick maturation of infection, frequency of pollution, and the predominance of old snails.

"The gradual fall of temperature in the autumn months, the start of the breeding season with the predominance of young snails, and the lesser liability of pollution lowers the infection rate gradually to almost nil by the end of the fall." *J. J. C. Buckley*

Bogliolo, L. Sôbre o quadro anatômico do fígado na forma hépato-esplênica da esquistossomose mansônica. [**Anatomical Changes of the Liver in Schistosomiasis mansoni**] *Hospital.* Rio de Janeiro. 1954, Mar., v. 45, No. 3, 283–306, 9 figs. [23 refs.]

The English summary appended to the paper is as follows:—

"The chief purpose of this paper is to study and attempt to characterize the anatomical features of the liver in the hepato-splenic form of mansonic schistosomiasis, as it occurs in Brazil. An analysis is also made of the anatomical mechanisms of the portal disturbance in this form of bilharziasis. The material used was 17 cases, all submitted to postmortem examinations and all suffering from the hepato-splenic form of schistosomiasis mansoni.

"I)—The majority of the cases (14 out of 17) presented the characteristics of 'clay-pipe-stem' cirrhosis of Symmers ('coarse periportal cirrhosis' of Hashem). The anatomical picture of this form is absolutely characteristic and allows the macroscopic diagnosis of the hepato-splenic form of schistosomiasis. It consists in a chronic productive granulomatous fibrotic peri-pylephlebitis. The connective tissue involved is that surrounding the large portal branch generally down to branches of the fourth order. As

a rule, the inflammation does not invade the lobules and so does not produce subversion and re-arrangement of the structure of the organ (*Umbau*; *remaniement*) as is the case in Morgagni-Laënnec's disease (hepatic cirrhosis). The hepatic lobules retain their morphological and functional individuality. The normal architecture is preserved in spite of the marked thickening of the connective tissue framework. In these 14 cases there were virtually no epithelial regenerative-hyperplasic phenomena.

" II)—Two of the 17 cases seemed to correspond in part to the ' diffuse bilharzial cirrhosis ' of Hashem. The fibrotic inflammatory process is the same as in the cases mentioned in I), but extends to the lobules forming true inter- and perilobular septa. In these cases also there was no subversion with re-arrangement of the hepatic lobular architecture (*Umbau*; *remaniement*), nor was there any epithelial regenerative-hyperplasic process.

" III)—One case showed an anatomical picture completely different from the others and from those hitherto described in the literature. The lesion was limited to a part of the organ and was similar to that of the ' flint liver '. Histologically, the inflammation was identical to that in the preceding cases but its seat was intralobular. There was complete disorganisation of the lobular architecture but no re-arrangement of structure.

" IV)—An analysis of the anatomical lesions shows in the great majority of cases of the hepato-splenic form of mansonic schistosomiasis, and notably in the ' clay-pipe-stem ' form of Symmers, that the disturbance of the portal circulation is the result of the following factors: rigidity and enlargement of the portal vessels due to fibrosis and retraction of the periportal connective tissue; hypocontractility of the portal vessels due to partial destruction of their muscular layer; increase of the periportal capillary area by neoformation of capillaries. All these factors combine to enlarge the intrahepatic portal circulatory area and cause a fall in the velocity of the blood flow. This mechanism, therefore, is entirely different from what occurs in Morgagni-Laënnec's disease (hepatic cirrhosis) which is characterised by diminution of the portal area and mechanical obstruction to the portal circulation.

" V)—In none of the 17 cases did the circulatory disturbance result from portal thrombosis.

" VI)—In none of the 17 cases could the macro- and microscopic hepatic picture be mistaken for any of the fibrosing hepatopathies. And especially was it always totally different from that of Morgagni-Laënnec's disease (cirrhosis of the liver)."

Naves, M., Correia, D. B. & Chaves, A. R. Ruptura espontânea do baço na esquistossomíase mansônica. [**Spontaneous Rupture of the Spleen in *S. mansoni* Infection**] *Med. Cirurg. Farmacia.* 1954, June, No. 218, 267–72, 2 figs. [17 refs.]

Account of a case in Belo Horizonte, Brazil.

Halawani, A., Abdallah, A. & Saif, M. **Miracil D in Schistosomiasis. A New Scheme of Treatment.** *J. Egyptian Med. Ass.* 1955, v. 38, No. 1, 49–62, 5 figs.

Miracil D (1-diethylamino-ethylamino-4-methyl thioxanthone hydrochloride) under its various proprietary names has already been used by the

senior author in the treatment of schistosomiasis in Egypt [this *Bulletin*, 1948, v. 45, 721, 797 and 1018; 1949, v. 46, 753; 1950, v. 47, 1204; 1953, v. 50, 428]. On the present occasion he has given it in sugar-coated tablets after meals for 20 days. No severe toxic effects on the heart, liver or kidneys were detected by electrocardiographic, biochemical or radiological examinations; but some minor toxic side-effects, such as nausea, vomiting, giddiness and in one case blurred vision, resulted either from cumulation of the drug or as a result of destruction of the adult worms. Where these side-effects were troublesome treatment was suspended for a day or two, or if considered necessary it was abandoned.

Eleven patients with *Schistosoma haematobium* infections were given 400 mgm. of Miracil D daily for 20 days; 5 of them ceased to pass eggs within 2 weeks of completion of the course of treatment. Another 8, suffering from the same infection, were given 500 mgm. daily for 20 days; one of these became negative during the treatment, 5 within 10–11 days, and one after 27 days; the remaining patient absconded. A further 15 patients also with *S. haematobium* infections were put on 500 mgm. daily as out-patients. Of 8 who completed the treatment, 7 were negative immediately after its completion. Yet another 15 hospital patients with this infection were put on 600 mgm. of the drug daily (200 mgm. thrice daily after food) for 20 days; 12 of them finished the course; of these 3 were negative soon afterwards, one 9 days, one 12 days, one 15 days, one 24 days and one 33 days after the end of treatment. Treatment was stopped in the remaining three on account of side-effects in association with other physical troubles, and the last was inadequately followed up.

One patient with *S. mansoni* infection was given 400 mgm. of Miracil D daily for 20 days, 2 were given 500 mgm. daily, and 10 were given 600 mgm. daily for a similar period. The 400 mgm. daily dosage failed to clear the eggs within a month; the 500 mgm. dosage did so in one case of the two; the 600 mgm. daily dosage cleared eggs in 6 of the 10 patients who completed it, and also in one of the others who continued it for only 18 days.

The authors consider Miracil D to be an effective drug for the treatment of schistosomiasis; the cure rate of *S. haematobium* infections is about 80 per cent.; all of 6 patients with *S. mansoni* infections completing the course of treatment advocated were cured. This course is 500 to 600 mgm. daily for 18 to 20 days for patients weighing 60 kgm. (*i.e.*, 10 mgm./kgm.).

A. R. D. Adams

Deschiens, R., with the technical collaboration of E. Lambault & H. Lamy. Incidence de la minéralisation de l'eau sur les mollusques vecteurs des bilharzioses. Conséquences pratiques. [**Effect of the Mineral Content of Water on the Vector Molluscs of Schistosomiasis and Its Practical Significance**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 6, 915–29.

The author's summary in French is translated freely as follows:—

The mineral content of collections of fresh water, domestic or natural, in warm or tropical regions, has an influence on the viability of aquatic molluscan vectors of schistosomiasis.

We carried out experimental studies on the degree of tolerance of *Planorbis glabratus* and *Bulinus contortus* to mineral salts and gases normally included in chemical analyses of water and we determined in grammes per litre the lethal dose of the different salts for the molluscs.

The results we obtained are confirmed by water analyses made in the field

in *Planorbis* and *Bulinus* habitats and by attempts to maintain molluscan vectors in thermal waters of various mineral constitutions.

From the practical point of view, the mineral content of water has its influence on the regional geographical distribution of molluscan habitats and foci of schistosomiasis; moreover, it is possible by analysis of domestic or natural waters to state that a particular water system may be free of molluscan vectors. *J. J. C. Buckley*

Clarke, V. de V. & Goodliffe, F. A. **Control of Bilharziasis: a Simple Device for measuring Copper Concentration in Natural Waters treated with Copper Sulphate.** *J. Trop. Med. & Hyg.* 1955, Apr., v. 58, No. 4, 80–85, 3 figs.

This paper gives a clear account, illustrated by a diagram and photographs, of a field technique which has been devised for measuring the copper concentration in natural waters which have been dosed with copper sulphate in the control of molluscs. The reagent used is potassium ferrocyanide which is sensitive to 3 parts per million of copper. A calibrated colour wedge is used for the measurement of the depth of colour produced by the reagent in the presence of copper. Details of designs are given and also of a method for compensating the error in matching which occurs when waters containing suspended matter are tested. The method gives rapid results and good conformity between the readings of separate observers was obtained. *M. E. Delafield*

Moon, A. P. & Hunter, G. W. **Studies on Schistosomiasis. VIII. Failure of Copper Oleate to afford Complete Protection to Mice against** *Schistosoma mansoni*. *Exper. Parasit.* New York. 1955, Mar., v. 4, No. 2, 165–71. [16 refs.]

"In *in vitro* tests cercariae of *S. mansoni* contacting copper oleate were killed in two hours. Water saturated with copper oleate was lethal to cercariae more rapidly.

"The effectiveness of copper oleate as a protective ointment against the cercariae of *S. mansoni* was tested on mice. The ointment afforded the mice over 90% relative protection but did not protect them completely. It is suggested that there may be fundamental physiological differences in the cercariae of *S. japonicum* and *S. mansoni* which may account for this apparent discrepancy in results."

Deschiens, R. & Lamy, L. Action prédatrice des écrevisses des genres *Astacus* et *Cambarus* sur les mollusques vecteurs des bilharzioses. [**Predatory Action of Crayfish of the Genera** *Astacus* **and** *Cambarus* **on Snail Vectors of Schistosomiasis**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 6, 809–12.

The following is a translation of the authors' summary:—

We have shown that several species of crayfish of the genera *Astacus* and *Cambarus* are predatory, in nature or in the aquarium, upon snail hosts of *Schistosoma haematobium* and *S. mansoni* belonging to the species *Planorbis glabratus*, *P. adowensis*, *Physopsis africana*, *Bulinus contortus*. The stocking or overstocking with Astacides of domestic water systems

(canals, irrigation channels) inhabited by the snail hosts of schistosomes in regions where schistosomiasis is endemic is suggested, with a view to acquiring an additional biological means of destroying molluscs. In Africa, one might consider the use of freshwater crabs of the genus *Potamon* [see also this *Bulletin*, 1952, v. 49, 781; 1954, v. 51, 1171; 1955, v. 52, 379].

H. J. O'D. Burke-Gaffney

McMullen, D. B., Hubendick, B., Pesigan, T. P. & Bierstein, P. **Observations made by the World Health Organization Schistosomiasis Team in the Philippines.** *J. Philippine Med. Ass.* 1954, Dec., v. 30, No. 12, 615–27. [19 refs.]

"The World Health Organization Team on Schistosomiasis in the Philippines spent approximately three months studying the problem there. Besides background data obtained on the population, public health, sanitation, economy, agriculture, education, etc., from each area visited the following points are of particular interest.

"1. Schistosomiasis japonica is primarily a rural disease and there are probably 200,000 to 300,000 cases in 12 endemic areas. Poor agricultural practices contribute to the seriousness of the problem.

"2. The Eastern Leyte, Panguil Bay and Compostela endemic areas appear to be the most important and in that order.

"3. For the first time *O. quadrasi*, the intermediate host, has been reported from stream origins in virgin forest found on alluvial plains. This appears to be the type of habitat in which these snails live before the land is cleared for farming. When this occurs many of the habitats are difficult to use agriculturally and are left more or less undisturbed. Changes that are made are gradual and often adaptation is possible.

"4. There is some evidence that *S. japonicum* is also present in the forested areas and that the commonly accepted relationship between the disease, man and rice farming is a comparatively recent development.

"5. All methods of control will have to be used but those directed toward the reduction or elimination of snail populations offer the best chance of success. Lack of knowledge on the biology of these hosts is a severe handicap. Correction of this should be one of the major objectives of any program.

"6. Under existing conditions molluscacides are impractical. For this reason environmental control should be instituted first.

"7. It has been recommended that a six-year pilot project on schistosomiasis control be set up in Leyte."

Deiana, S. Osservazioni sulla penetrazione delle cercarie di *Schistosoma bovis* (Sonsino, 1876) nella pelle del coniglio. [**Observations on the Penetration of the Skin of Rabbits by the Cercariae of** *Schistosoma bovis*] *Riv. di Parassit.* Rome. 1954, Oct., v. 15, No. 4, 373–80, 4 figs. English summary (5 lines).

The author's conclusions are essentially as follows:—

(1) The cercariae of *S. bovis* penetrate the skin of rabbits with relative ease and the majority may be found after 12 hours to have passed through the stratum corneum, and to be lying in the malpighian layer, while after 24 hours they are usually in the dermal tissues. However, after 48 hours the cercariae can no longer be found, possibly because they have reached

the blood circulation or the lymphatic vessels by which route they reach their definitive site in the body (mesenteric venous system).

(2) The larval form of *S. bovis* penetrates the skin vertically to its surface, and progresses through the stratum corneum either by means of a mechanical action (movement of the body) or by a lytic action (secretion of the lytic glands), an observation which has already been reported in the case of other cercariae such as *S. mansoni*. The parasite then penetrates deeper into the skin, horizontally to the epidermal layers, travelling for a short while in the stratum malpighi and in the stratum lucidum. In the dermis the parasite progresses without any particular orientation, probably because it seeks the shortest possible route to the blood and lymphatic vessels.

(3) The skin reactions of rabbits which have been exposed to the cercariae of *S. bovis* for the first time are of little consequence, although there is some "retraction of the epithelial tissues", accompanied by a sparse infiltration of eosinophils in the dermis, a passive hyperaemia, and a few small haemorrhages. Complete healing occurs shortly after the disappearance of the parasite. [These observations are in close agreement with those previously recorded by Gordon and Griffiths (this *Bulletin*, 1952, v. 49, 1055) and by Griffiths (*ibid.*, 1954, v. 51, 285) who observed the penetration of the skin of mice by the cercariae of *S. mansoni*.]

R. M. Gordon

Ch'in, K. Y., Lei, A. T. & Wang, T. Y. **Primary Mucinous Carcinoma of Liver associated with *Clonorchis sinensis* Infection.** *Chinese Med. J.* Peking. 1955, Jan.–Feb., v. 73, No. 1, 26–35, 10 figs. on 5 pls.

Crane, P. S., Bush, O. B., Jr. & Won, Pak Chung. **Treatment of Clonorchiasis with Chloroquine and Methiscol.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Jan., v. 49, No. 1, 68–70.

In 1948 it was estimated that over one million persons suffered from clonorchiasis in the basins of Naktong, Kum, Nam and Sumgin rivers in South Korea: in one village in a total of 100 stools, 84 were found to contain ova [presumably of *Clonorchis sinensis*], and "flagellate forms" of this parasite were to be found under the gills of small fish in the tidal rivers where the fresh water mixed with the sea water.

The authors had had considerable experience in the treatment of clonorchiasis with emetine, arsenicals and several vermifuges, but "with only negative results". In 1949 they used chloroquine with encouraging results, but their records were lost during the Korean War; in 1953 they again took up this work and treated 34 patients with clonorchiasis with this drug. In 12 cases the stools were negative at re-examination after a month's interval, and in 17 others ova had decreased. The dosage was 0·5 gm. thrice daily for 2 weeks, orally.

In 12 cases Methiscol was also given; in these cases 6 stools were negative at the re-examination. Other drugs were also given in all cases. In every patient treated there was symptomatic improvement.

[Altogether 8 apparently proprietary preparations besides Aralen (chloroquine) were given to the patients in various combinations. Some British readers will be familiar with Milibis (bismuth glycollylarsanilate), but few with any of the other preparations, and in no instance is there any indication of the composition of these proprietaries; this applies to Methiscol also, although the name is included in the title of this paper. The reviewer failed

to find Methiscol in the latest edition of either Martindale's *Extra Pharmacopoeia* or *New and Non-Official Remedies.*] *L. E. Napier*

Yogore, M. G., Jr. & Tangco, A. F. **Notes on Sparganosis in a Filipino.** *Acta Med. Philippina.* 1953, Apr.–June, v. 9, No. 4, 301–3.

This paper records the occurrence of a sparganum found in a subcutaneous nodule on the thigh of a Mission Sister in the Philippines. She had noticed the lump some 5 years before in Mindanao. Apart from occasional episodes of redness, pain and itching, there were no clinical manifestations. The nodule was excised and the contained larva was found to be alive (which is believed to account for the mild local symptoms). It was identified as "a non-proliferating sparganum (of a pseudophyllidean cestode)". Species identification was not possible.

The authors speculate on how the patient acquired the parasite. It is of interest that she was born and grew up in Pulilan, Bulacan, the same town in which the only other recorded case of sparganosis in a Filipino occurred in 1935. There is a possibility that the parasite was acquired in Mindanao, where the drinking water came from rain-water tanks which may have been infected with *Cyclops.* *H. J. O'D. Burke-Gaffney*

Pezenburg, E. & Oleck, H. G. Über Missbildungen bei *Taenia saginata.* [**A Deformity in** *Taenia saginata*] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1955, Apr., v. 6, No. 1, 106–11, 2 figs. [19 refs.]

The English summary appended to the paper is as follows:—

"A mal-formed strobila of Taenia saginata was found in a patient of a Berlin hospital. The anomaly is described and compared with other cases on record."

Benetazzo, B. & Salemme, M. A. Sulle reazione immunobiologiche sieriche con estratti di *Taenia saginata* e con liquido idatideo in infestati da platelminti e da nematodi. [**Serological Tests with Extracts of** *Taenia saginata* **and Hydatid Fluid in Cestode and Nematode Infections**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1955, Mar., v. 36, No. 3, 107–23. [18 refs.]

The English summary appended to the paper is as follows:—

"After a summary of preceding research, the authors refer to the results of precipitation reaction and complement-fixation tests with water or alcoholic extracts of *Taenia saginata* and hydatid fluid in patients suffering from hydatid or infested by *T. saginata* or *Nematoda* (*ascaris* and *oxyuris*) and in uninfected individuals. Cross-reactions have been positive, with more or less intensity, in a good number of patients suffering from hydatid or taeniasis; in other cases the same reactions proved nearly completely negative. With regard to the techniques to be followed in preparing antigens of *T. saginata*, the best results were obtained with water extracts.

"The authors are of the opinion that in individuals infested by *T. saginata* there is a formation of immune-bodies, that reactions show a group specificity and can be positive even after disinfestation. From a practical point of view, in the absence of clear clinical signs of hydatid, the positivity of the Ghedini reaction must be accepted after having ascertained that there is no present nor previous intestinal taeniasis."

Ranque, J. & Nicoli, R. N. Considérations parasitologiques sur la cénurose cérébrale, à propos d'un nouveau cas. [**Parasitological Observations on Cerebral Coenuriasis, with reference to a New Case**] *Ann. Parasit. Humaine et Comparée*. 1955, v. 30, Nos. 1/2, 22–42, 21 figs. [18 refs.]

The authors' summary in French is freely translated as follows:—

We record the ninth occurrence of human cerebral coenurosis. In the cases hitherto published it has not always been possible to identify the causal organism with certainty. We refer ours to *Coenurus multiceps*, larva of *Taenia* [*Multiceps*] *multiceps* Leske, 1780, on the basis of the shape of the hooks and of the habitat of the coenurus.

Since man is an abnormal host for this larva, the scolices mostly are abnormal in morphology; it was necessary to examine a great number of them to find some that were identifiable. [See this *Bulletin*, 1952, v. 49, 161, 419.] *J. J. C. Buckley*

Simitch, T., Bordjochki, A. & Angelovski, T. Longévité des embryons dans les oeufs d'*Hymenolepis nana* en dehors de l'hôte. [**The Longevity of Embryos in the Eggs of** *Hymenolepis nana* **outside the Host**] *Arch. Inst. Pasteur d'Algérie*. 1955, Mar., v. 33, No. 1, 30–34.

The variable incidence of *Hymenolepis nana* in man in different countries has not been completely explained. It is very rare in France, Belgium and the Nordic countries of Europe, but in the Balkan and other Mediterranean countries its incidence is 5 to 20 per cent. and in Yugoslavia the proportion of schoolchildren infected varies from 0·3 per cent. in Slovenia to 7·5 per cent. in Macedonia, but in parts of Macedonia and Montenegro up to 40 per cent. of the schoolchildren are infected.

Opinion differs about the part played by rats and mice as sources of human infection. Joyeux and Foley [this *Bulletin*, 1931, v. 28, 202] think that these rodents do not play any part in human infection and that *H. nana* of man is biologically different from *H. nana* var. *fraterna* of the rat and mouse. Chandler [*ibid.*, 1927, v. 24, 990; and see also his *Introduction to Parasitology* (*ibid.*, 1950, v. 47, 1237)] considers that *H. nana* in rodents and man are biologically the same and that rodents can pass the infection to man. Shorb [*ibid.*, 1934, v. 31, 117] considers that man can be infected by eggs derived from rats and mice, but that children are less susceptible to the rodent infection. Craig and Faust [*Clinical Parasitology*, *ibid.*, 1946, v. 43, 506] believe that man is probably the only common source of human infection, but that the variety of *H. nana* found in rodents is infective to man only under exceptional circumstances. Simitch *et al.* [*ibid.*, 1954, v. 51, 293; 1955, v. 52, 665], using the rodent *Citellus citellus*, which can be infected so abundantly that 5 to 10 eggs of *H. nana* may be found in each field of a faecal preparation, showed that *H. nana* from rodents and man are biologically identical and that eggs from man can infect rodents and *vice versa*. But the viability of eggs derived from rats and mice depends on the temperature and humidity of the surroundings of these eggs when they contaminate human food.

For the experiments here recorded the authors used eggs derived from two *C. citellus* infected experimentally with eggs from a white rat. Faeces containing these eggs, spontaneously voided, were exposed either dry and compact, dry and crumbled or under water at the temperatures shown in the table given below. The eggs were then given by mouth to 43 *C. citellus* which were killed on the 11th day, when their small intestines were examined for worms. The results can be tabulated as follows:

Faeces	*Viability of embryos in the eggs*					
	20°C.	37°C.	41–42°C.	Direct sunlight 40–42°C.	0°C.	2°C.
Dry Compact	48 hrs. not 72 hrs.	4 hrs. not 8 hrs.	2 hrs. not 4 hrs.	2 hrs. not 3 hrs.	6 days	10 days
Crumbled	24 hrs. not 30 hrs.	2 hrs. not 4 hrs.	1 hr. not 3 hrs.	1 hr. not 2 hrs.		
In water	30 days	80 hrs. not 120 hrs.	6 hrs. not 10 hrs.	24 hrs. not 30 hrs.		

Thus, in dry, compact faeces, the longevity falls as the temperature rises in such a manner that in summer it does not exceed 24 hours. The quicker fall in crumbled faeces is proportionate to the quicker drying of such faeces. In faeces exposed to direct sunlight at 40–42°C. the longevity is almost the same as in faeces exposed to 41–42°C. in the incubator, so that the rays of the solar spectrum seem to have no action of their own; but in faeces exposed to the sun in water the longevity is 24 hours. In water the longevity of more than 30 days at 20°C. falls to 6 hours at 41–42°C. Thus, according to the authors, the eggs in water or in a humid medium are infective for several days even in the summer.

However, the authors consider that, although rodents can in certain cases be sources of human infection in nature, man is the chief source of human infection and rodents the chief source of rodent infection. They also think that the explanation of the great frequency of *H. nana* in children in certain Balkan countries and also in the Indian miners examined by Chandler (*loc. cit.*) is to be sought, not in the abundance of infected rodents in these countries, but in the bad personal and general hygiene.

G. Lapage

Yener, M. S. Un cas de kyste hydatique siégeant aux deux bases pulmonaires. [**Hydatid Cyst situated at the Lung Bases**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1955, Nos. 7/8, 243–5, 2 figs.

Grossiord, A., Pecker, J. & Bitry-Boely, C. Hydatidose vésiculaire de la queue de cheval. [**Vesicular Hydatid Cyst of the Cauda Equina**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1955, Nos. 7/8, 289–94.

Fain, A. & Herin, V. Notes à propos d'un cas d'infestation humaine par un *Mesocestoïde* à Astrida (Ruanda-Urundi). Présence de ce cestode chez le chat et découverte de larves du type *Tetrathyridium* chez divers vertébrés. [**Human Infestation with *Mesocestoides* at Astrida, Ruanda-Urundi. Presence of this Tapeworm in a Cat and Evidence of the Larvae in Various Vertebrates**] *Ann. Soc. Belge de Méd. Trop.* 1954, Dec. 31, v. 34, No. 6, 893–900, 2 figs.

The following is a translation of the authors' summary:—

The authors record the discovery of a *Mesocestoides*, probably of a new species, in a European child in Astrida, Ruanda-Urundi. Two months

before passing the first proglottides the child had eaten the raw meat of a partridge (*Pternistes afer nyanzae*) and this was probably the origin of the infection.

The same worm was found at Astrida in an indigenous domestic cat which seems to be a natural host for the parasite.

The infective larva of *Mesocestoides*, or tetrathyridium, has been found in the Belgian Congo and in Ruandu-Urundi in rodents, insectivores and in wild and domestic birds, especially in fowls and partridges [for the first record of a human case, see Chandler, this *Bulletin*, 1943, v. 40, 323].

H. J. O'D. Burke-Gaffney

Martins, O. N. A propósito da ancilostomiase na Ilha de S. Tiago de Cabo Verde. [**Observations on Ankylostomiasis on the Island of S. Tiago, Cape Verde**] *Anais Inst. Med. Trop.* Lisbon. 1954, Sept.–Dec., v. 11, Nos. 3/4, 665–73.

Behrenz, W. Die Scheidenfärbung, ein einfaches diagnostisches Hilfsmittel zur Unterscheidung infektiöser Hakenwurmlarven von unbescheideten freilebenden Nematoden und ihren Larven. [**Sheath Staining, A Simple Diagnostic Method for differentiating between Infective Hookworms and Free-Living Nematodes**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1955, Apr., v. 6, No. 1, 111–14.

The English summary appended to the paper is as follows:—

"Experiments on Uncinaria stenocephala showed that the sheath of their larvae readily adsorbs acridin orange while the cuticula of free-living nematodes does not. This behavior points to a handy method to distinguish hookworm larvae from those of free-living nematodes."

Lippi, M. & D'Ercole, G. Terapia dell'anchilostomiasi con l'associazione di esilresorcinolo e tetracloroetilene per instillazione duodenale. [**Treatment of Ankylostomiasis with a Combination of Hexylresorcinol and Tetrachloroethylene given through the Duodenal Tube**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1954, Oct., v. 35, No. 10, 489–94. English summary (7 lines).

The authors have treated 8 patients, the youngest being 12 and the oldest 54 years of age, and they describe the technique which they have followed. The patient is prepared for the duodenal intubation by a 3-day course of appropriate sedatives (Luminal, papaverine) and is put on a liquid diet and given a saline the evening before. The preparation used (Hydroxylen) consisted of hexylresoricinol 1 gm., tetrachlorethylene 4 cc., ground-nut oil 15 cc. [See Basnuevo, *Revista Kuba de Med. Trop.*, 1952, v. 8, 29.]

Fifteen cc. of the anthelmintic are given to an adult (and 1 cc. per year of age in the case of children up to 12), after emulsifying it in 200 cc. of warm water. A second saline is given the same evening.

A specimen of stool is examined daily and the treatment is repeated after 8–10 days so long as eggs continue to be found. A final precautionary treatment is given after the stools have remained negative for 8 consecutive days.

In three of the authors' cases the eggs disappeared after one duodenal treatment, in two after the second treatment; two others had to have three treatments and one a fourth treatment before the examination of the stool proved negative for hookworm eggs.

J. Cauchi

Hilburg, C. J. Control de la anquilostomiasis en el Paraguay. [**Hookworm Control in Paraguay**] *Bol. Oficina Sanitaria Panamericana.* 1955, Jan., v. 38, No. 1, 10–19, 6 figs. English summary.

Surveys of Asuncion and Villarica showed rates of hookworm infection of 49·9 per cent. and 60·6 per cent., respectively. This paper discusses at length the programme of control, which consists of "medication against parasites, adequate waste disposal, and health education of the population".

Dubernat. Formes cliniques de l'ascaridiose. [**Clinical Forms of Ascariasis**] *Rev. Méd. Nav.* (*Métropole et Outre-Mer*). Paris. 1955, v. 10, No. 1, 49–57.

A general account with 12 illustrative cases.

Lippi, M. & Tripodi, P. Allergia nell'ascaridiosi. [**Allergy in Ascariasis**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1955, Feb., v. 36, No. 2, 65–104. [Numerous refs.]

The English summary appended to the paper is as follows:—
"The authors, after a short summary on the aetiopathogenesis of ascaridiasis, review the literature on allergy in ascaridiasis. It is their opinion that the possibility of allergic phenomena in ascaridiasis is proved beyond discussion."

Swartzwelder, C., Miller, J. H. & Sappenfield, R. W. **The Treatment of Cases of Ascariasis with Piperazine Citrate. With Observations of the Effect of the Drug on other Helminthiases.** *Amer. J. Trop. Med. & Hyg.* 1955, Mar., v. 4, No. 2, 326–31.

The authors refer to earlier literature on the treatment of ascariasis with piperazine. They themselves treated 26 patients, aged 1 to 32 years, infected with *Ascaris lumbricoides*, with an orange-flavoured syrup (Antepar) containing piperazine citrate in an amount equal to 100 mgm. of piperazine hexahydrate per cc. The patients were not purged before or after treatment and were not fasting. Of the 26, 15 were in hospital and these were closely observed; 11 were out-patients and the mothers of these were asked to observe them at home. For the examination of stools the formalin-ether sedimentation technique was used before, during and after treatment and Stoll dilution egg-counts were made on all stools that showed eggs. Stool examinations were done on the hospital patients at intervals of 1–2 days during and after treatment until the patients showed no eggs in 1 to 6 post-treatment stools. For the out-patients stools were at first examined at intervals of 1 and 2 weeks after treatment started, but later a single stool was examined one week after treatment began. The passage of worms during treatment and absence of eggs in stools 1 and 2 weeks after treatment began showed that infections were being eliminated. Failure to demonstrate eggs after treatment was not due to suppression of the egg output of the worms.

In 25 patients the egg counts ranged from 500 to 117,000 eggs per gm. of faeces and 8 patients had egg counts of over 30,000 per gm. The daily dose of piperazine was 25 to 78 mgm. per lb. body weight [presumably of piperazine hexahydrate] given in 2 or 3 equal doses daily according to the volume of the drug. More than 70 mgm. per lb. body weight per day was given to 11 patients. The maximum dose per lb. body weight given over

8 days was 555 mgm. A table shows the ages of the patients, their body weights, the maximum daily dosage and the total dose given to each of them, the duration of the treatment (3 to 15 days), the egg counts before and after treatment and the percentage reduction of the egg counts.

In 22 of the 25 patients the reduction of the egg count was 100 per cent. In 1 or 2 other patients, who began with an egg count of 117,000 eggs per gm., the reduction was 98 per cent.; in the other, who had an initial egg count of 31,500 eggs per gm., the reduction was 97 per cent. In one patient, who had a light infection, the egg count was not reduced, although this patient passed 2 worms. In one patient without eggs in the stools, although these had been present earlier and female worms had been passed, piperazine caused the passage of 2 male worms.

When about 75 mgm. per lb. body weight of the drug were given daily for 5 days, no failures of treatment occurred. The total dose did not exceed 3 gm. No failures occurred when more than 10 gm. were given. In 5 out of 7 patients with light infections receiving 38–75 mgm. per lb. body weight daily, 100 per cent. reductions of the egg counts occurred. In all patients treated for more than 3 days, almost complete elimination of the worms occurred. In a few cases worms were voided only during the first 2 days of treatment and the stools promptly became free from eggs, a result which showed that some infections may be eliminated by treatment for 1 or 2 days with the doses used. Both immature and mature worms were eliminated and the worms were alive but sluggish and flaccid. Vigorous adult worms put in a 1 to 10 aqueous dilution of the piperazine syrup also quickly became flaccid and immobile, but they recovered when they were rinsed with water. The authors suggest that piperazine renders the worms unable to "maintain traction against the intestinal mucosa".

No toxic effects were observed and no abnormality was revealed by blood counts, analyses of the urine, cephalin flocculation and other tests. One child, aged 3, weighing 23 lb., not included in the series, took about 400 mgm. per lb. body weight (90 to 110 cc. of the syrup) and vomited a small volume of it 5 hours after taking it, but the laboratory tests were normal and the only significant findings were transient hypoactive patellar reflexes and apparent inability to sit erect. One patient with larva migrans and another with both larva migrans and ascariasis were given piperazine citrate and there were no allergic or anaphylactic reactions related to the drug in either patient. In one case infected with hookworm there was a decrease of 83 per cent. in the hookworm egg count during treatment with 1·5 gm. piperazine citrate daily for 10 days. Ghanem [this *Bulletin*, 1954, v. 51, 617] reported that a piperazine compound was active against *Ancylostoma duodenale*. Jones (personal communication to the authors) reported that 3 gm. daily of piperazine citrate for 7 to 10 days failed to cure 3 cases of strongyloidiasis. The present authors found that piperazine was not effective against *Trichuris trichiura* or *Hymenolepis nana*.

The results thus confirm the report by Brown and Sterman [this *Bulletin*, 1955, v. 52, 62] on the high efficiency of piperazine for the treatment of ascariasis. In both that paper and the present one treatment for 3 days failed to cure, but a daily dose of 70–75 mgm. per lb. body weight for 4 days or more is apparently more than is needed to cure most light infections. The authors do not recommend a routine dose of 70 mgm. per lb. body weight, but this was usually completely effective for heavy infections and the children treated tolerated it well. The treatment required over a period of days causes no difficulty in the treatment of individuals, but limits the use of the drug for mass therapy, unless an effective single dose can be devised.

G. Lapage

YAMAGUTI, S., INATOMI, S. & KIMURA, M. **Experimental Studies on Ovicidal Substances occurring in Human Nightsoil.** *Exper. Parasit.* New York. 1955, Mar., v. 4, No. 2, 87–91, 2 figs.

"1. Human nightsoil treated with viscera of raw fish, superphosphate of lime, and *E. coli* cultured in Gale's casein-glucose-broth showed marked ovicidal properties against *Ascaris lumbricoides* eggs.

"2. An acetone insoluble fraction from the acidulous fecal mixture, consisting chiefly of fecal bacteria, was the only ovistatic agent isolated, and it was not sufficiently ovicidal when used alone or in combination with any of the acetone soluble fractions."

JORDAN, P. **Bancroftian Filariasis: an Assessment of its Economic Importance in Tanganyika.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, May, v. 49, No. 3, 271–9, 1 chart. [12 refs.]

Surveys for filariasis in Tanganyika [this *Bulletin*, 1954, v. 51, 1180] show that there are 3 foci of infection—an extensive coastal area extending up river valleys in the Southern Province, an area at the south end of Lake Victoria, and an isolated heavily-infected focus at the north end of Lake Nyasa. The present paper deals mainly with bancroftian filariasis in the male.

Microfilaraemia does not produce any reduction of haemoglobin in the blood. Adult males with hydrocele or elephantiasis of the legs are significantly heavier than normal and generally have higher blood pressure; on the other hand, females with elephantiasis weigh more than normal, but blood pressure is not raised.

In the early stages microfilaraemia may constitute the only evidence of infection.

A questionnaire of workers with and without microfilaraemia showed that a slightly higher percentage of the former miss work. Analysis of the daily sick book from large prisons in an infected area shows that only 3 per cent. of nearly 1,000 entries were possibly related to filarial disease.

On Ukara island—a hyperendemic area in Lake Victoria—some 15 cases of clinical filarial disease were encountered among 1,216 new patients. One of the most striking manifestations among the Wakara is acute lymphangitis and cellulitis with adenitis of the inguinal and femoral glands. The incidence of hydroceles is related to the microfilaraemia rate. In some districts over 30 per cent. of adults suffer in this manner. In many cases the hydroceles developed after an attack of scrotal pain. Patients with elephantiasis suffer more severely from incapacitating attacks of pain and fever than those with hydroceles.

There is some evidence that the drag on the spermatic cord and surrounding tissues in cases of hydrocele and elephantiasis of the scrotum predisposes to hernia [HAWKING, this *Bulletin*, 1941, v. 38, 147].

The effect of filariasis on reproduction was also investigated and it seems that the number of children of normal fathers increases regularly as the age of the father increases, but in the hydrocele group, though at first there appears to be an increase, this is not maintained. When they are present for a number of years hydroceles affect fertility. In females a high incidence of microfilaraemia has been shown to exist in aborting women in a bancroftian endemic area.

In the Central Province, where *W. bancrofti* is unknown, there are 21 normal births to each abortion, compared with 9·6 per cent. in the Southern Province where a very high incidence of filariasis has been found.

Elephantiasis is very prevalent to the north of Lake Nyasa and in parts of the Southern Province. On Ukara Island an incidence of 4 per cent. has been reported and on Mafia Island 14 per cent. [Hawking, *loc. cit.*].

Philip Manson-Bahr

Chow, C. Y., Thevasagayam, E. S. & Wambeek, E. G. **Control of *Salvinia* —a Host Plant of *Mansonia* Mosquitos.** *Bull. World Health Organization.* Geneva. 1955, v. 12, No. 3, 365–9.

"Pentachlorophenol (12–16% PCP) was found to be a satisfactory herbicide for the control of *Salvinia*—a weed pest of irrigation and agriculture and also a host plant of *Mansonia* mosquitos. Applied at the dosage of eight to ten US gallons per acre (diluted with water to give a spray of 160 US gallons per acre), this chemical killed all the young plants and most of those in the middle stage of development in seven to ten days. For the full-grown plants, two applications—the first at the higher rate of ten US gallons per acre—were necessary."

Webber, W. A. F. & Hawking, F. **Experimental Maintenance of *Dirofilaria repens* and *D. immitis* in Dogs.** *Exper. Parasit.* New York. 1955, Mar., v. 4, No. 2, 143–64, 4 figs. [15 refs.]

D'Haussy, R., Boithias, R. & Bertet, P. L'onchocercose en A.O.F. L'onchocercose oculaire. [**Ocular Onchocerciasis in French West Africa**] *Bull. Méd. de l'Afrique Occidentale Française.* 1954, Nov., No. 2, Special No., 111–39, 15 figs. (5 coloured) on 6 pls.

From the 1st of January 1951 to the 30th of June 1954 the authors and their colleagues have examined 12,816 African patients in French West Africa. Of these patients 583 showed the presence of *Onchocerca volvulus* in biopsies of the skin or conjunctiva.

In chapter I they discuss the prevalence of the disease in the various regions. Chapter II is devoted to the subjective signs, the lesions of the anterior segment and those of the posterior segment of the eye. Chapter III is devoted to the evolution of the ocular signs and chapter IV to the treatment of ocular complications.

They advocate for treatment: 4 courses of Notezine [diethylcarbamazine], each course consisting of 4 tablets a day for 10 days with intervals of 10 to 20 days; 5 or 10 weekly injections of Moranyl [antrypol] in doses of 1 gm. for adults.

They are unable to form an opinion of the efficacy of therapy on the ocular lesions but from their clinical and statistical studies have tried to point out the frequency and the gravity of ocular complications in African onchocerciasis.

The article is illustrated by excellent drawings and paintings.

E. W. O'G. Kirwan

Burch, T. A. Proyecto piloto de una campaña de tratamiento médico de la oncocercosis, basado en la administración de suramina sódica (U.S.P. XIII). Parte I. Encuesta pretratamiento. [**Pilot Project for a Medical Treatment Campaign against Onchocerciasis based upon the Administration of Suramin Sodium (USP XIII). Part I. Pretreatment Survey**] *Bol. Oficina Sanitaria Panamericana.* 1955, Jan., v. 38, No. 1, 20–25.

The English summary appended to the paper is as follows:—

"1. In preparation for a pilot project for the medical treatment of onchocerciasis with suramin (USP XIII) 1,142 inhabitants from Yepocapa, Chimaltenango, Guatemala, were examined for various manifestations of onchocerciasis.

"2. Approximately half of all adults examined had demonstrable microfilariae on skin biopsies. The youngest individual with a positive biopsy was two years old.

"3. One fourth of the subjects examined had palpable nodules. Fifty-four per cent of the nodules were located on the head. The remaining were fairly evenly distributed between the thorax and pelvic region with but one per cent palpated on the arms or legs.

"4. The youngest patient on whom a nodule was proved to be onchocercal was a twenty-six month old child. A nodule was palpated on an eighteen month infant, but examination following excision proved it to be a hypertrophied lymph node.

"5. Twenty-six or 2·2 per cent of the population examined were blind in one or both eyes.

"6. Ocular symptoms consisting of entopic vision of worms, hazy vision and unpleasant sensations were encountered in approximately one fourth of the subjects interviewed.

"7. Visual acuity was diminished in a little more than one third and visual fields constricted in one eighth of the individuals tested.

"8. Examination with a hand slit lamp showed alterations of the conjunctiva and limbus in 15·9 per cent of the patients examined. Punctate corneal opacities were observed in 12·6 per cent and other corneal opacities in 9·7 per cent of the patients. Visual fields were decreased in less than half of the patients with these conditions.

"9. Seventy-seven individuals or 6·7 per cent of those examined had evidence of iritis or iridocyclitis. Evidence of onchocerciasis was found in more than ninety per cent of these patients. More than three fourths of such patients with no apparent corneal pathology had impaired visual acuity or constricted visual fields."

BROWN, H. W. & CHAN, K. F. **Treatment of *Enterobius vermicularis* Infections with Piperazine.** *Amer. J. Trop. Med. & Hyg.* 1955, Mar., v. 4, No. 2, 321–5, 1 fig.

The authors quote earlier work on this subject and refer to the work of BROWN *et al.* [this *Bulletin*, 1954, v. 51, 1087], who found that piperazine is very effective against adult *Syphacia*, but only slightly so against the immature stages of this genus. This suggested that interrupted treatment spread over several days to allow time for the immature stages to become mature might be effective; however, when this was tried by the authors against *Enterobius*, in the form of a "split 14-day" course with a 7-day rest period, *Enterobius* eggs were found during the rest period, so that family- and self-infection were possible during this period. They therefore treated 120 patients for 10 and 14 days respectively, and this paper records the very good results.

The 120 patients were aged 1–52 years. One group consisted of private patients referred by doctors; some of these had been treated unsuccessfully with gentian violet, oxytetracycline and Egressin. In this group the doctor took swabs on Scotch tape 800, or the mother was instructed how to take them. The second group consisted of adolescent and adult patients in a

local school for mental defectives and one nurse took all the swabs from these. The unhygienic habits of these patients made them especially liable to infection.

The piperazine citrate syrup was measured in a standard teaspoon holding 4 to 6 cc., according to how full it was and the dose was therefore variable to this degree; but no toxic effects were noted. It was given by the mother to the private patients and by the nurse to the others. The doses were graduated according to the body weight of the patients as follows: 15–30 lb.—half a teaspoon (2·5 cc.) b.i.d. = 0·25 gm. piperazine hexahydrate b.i.d.; 31–60 lb.—1 teaspoon (5 cc.) b.i.d. = 0·5 gm. piperazine hexahydrate; 61 lb. and over—2 teaspoons (10 cc.) b.i.d. = 1 gm. b.i.d. Seven days after the end of treatment, swabs were taken for 7 consecutive mornings. The criterion of cure was failure to find eggs on all 7 swabs.

Because the dosage thus given varied, the daily doses ranged from 22 to 75 mgm./kgm. of the hexahydrate daily. The authors' data show that 50 mgm./kgm. daily is very effective when it it is given for 10 to 14 consecutive days. The doses were given for 10 days, or 14 days, or for two 7-day courses with 7 days' rest between them. Of those having the 10-day course 26 had single swabs on the 7th and 10th days, when 9 and 5 were positive respectively; this showed that many patients on a split 14-day course will be infective during the rest period.

The results obtained with the syrup were as follows:

	Treated	Cured	Per cent. cured
10-day course	57	51	89
Two 7-day courses, 1 week apart ...	24	22	92
14-day course	39	38	97
Untreated controls	11	2	18

A text figure shows the relationship of the size of the dose of piperazine hexahydrate to its efficiency. It was found that a total daily dose of 45 mgm./kgm. body weight, or more, of the hexahydrate was 100 per cent. effective whether it was given for 10 or 14 days, but that the failures occurred in the group receiving 30 to 44 mgm./kgm. body weight.

Twelve patients were treated with wafers containing calcium dipiperazine dicitrate, the same amount of piperazine hexahydrate being used as that given in the syrup. This treatment was given as a split 14-day course and cured 10 of the 12 patients. The patients took the wafers, but found them rather acid and unpalatable.

The authors refer to White and Standen [this *Bulletin*, 1954, v. 51, 423] who reported mild side-effects, with rapid recovery, and suggested that these effects were due to excess doses taken because of great variation in measurement of the syrup by teaspoons of variable capacity.

The authors add that they were not successful in treating several patients infected with *Necator americanus*, *Trichuris trichiura* and *Giardia intestinalis* with piperazine. *G. Lapage*

Rachelson, M. H. & Ferguson, W. R. **Piperazine in the Treatment of Enterobiasis.** *Amer. J. Dis. Children.* 1955, Mar., v. 89, No. 3, 346–9. [12 refs.]

The authors briefly discuss various drugs that have been used for the treatment of enterobiasis and the disadvantages associated with them. They then discuss the chemical composition of piperazine, and briefly summarize the literature (most of which has been abstracted in this

Bulletin) on its use for the treatment of enterobiasis and record their own successful experiences with it.

Enterobiasis is the commonest [presumably human] helminth infection in the United States and it has been a major problem among dependent children in the military service. Recently the authors [this *Bulletin*, 1955, v. 52, 565] found an incidence of 31·5 per cent. among children up to 12 years old at the pediatric section of a U.S. Air Force hospital.

In the present paper the authors record the results of treatment of 150 patients with piperazine citrate at the same hospital, 138 being children between the ages of 10 months and 13 years. The results showed, however, that neither the age nor the sex affected the results.

Diagnosis was made by finding eggs of *Enterobius vermicularis* by the Graham Scotch tape method. In infected households the only persons treated were those who showed eggs on any of 3 consecutive daily perianal swabs. An orange-flavoured syrup was used, which contained an amount of piperazine citrate equivalent to 100 mgm. of piperazine hexahydrate per ccm. or 500 mgm. per teaspoonful. This was given on 7 consecutive days, followed by a rest for 1 week, with a second course, lasting 7 days, immediately after the rest period. The doses were: children up to 15 lb. (6·8 kgm.) body weight, 250 mgm. once daily; 15–30 lb. (6·8 to 13·6 kgm.), 250 mgm. twice daily; 30 to 60 lb. (13·6 to 27·2 kgm.), 500 mgm. twice daily; over 60 lb. and adults, 1,000 mgm. twice daily. All patients were given very strict instructions for personal hygiene which are listed in detail. After the second course of treatment, 3 daily perianal swabs were taken upon awakening and, if no eggs were found on any of these, the patient was considered to be cured.

Of the 150 patients treated only 16 showed eggs after treatment, so that the initial cure rate was 89·3 per cent. Of the 16 patients not cured, 12 were given an additional week of treatment with the same doses and hygienic precautions. All these 12 were then cured, without any side effects, so that the overall cure rate became 97·3 per cent., the total number of cures being 146.

Study of the results showed that the amounts of piperazine given made no appreciable difference to the cure rate and similar results were obtained with large variations in the dosage. The lowest dosage given was 15 mgm./kgm. body weight and the maximum 71 mgm./kgm. Side effects occurred only when 26 to 50 mgm./kgm. were given and " in no instance was a side-effect noted using a dosage greater than 50 mg/kg ".

Side effects were seen in 7 patients only. There were 4 instances of urticaria; when the orange-flavoured vehicle was given alone, no urticaria resulted and the authors consider that it may have been due either to proteins absorbed from dead worms or to allergy to piperazine. There was one mild case of erythema multiforme, one of mild diarrhoea which was easily cured, and one of slight nausea and lethargy during treatment. No abnormality of the blood or urine was noted in 25 patients in whom these fluids were examined. Two pregnant women suffered no ill effects.

The drug was readily taken and was palatable, and the authors conclude that it is satisfactory for the treatment of enterobiasis. The cost of the doses used by the authors is reasonable and the cure rate obtained by them was higher than that obtained by other authors, although some of these have recommended higher doses. The drug was found to be specially valuable for infants and small children. It is an advantage that it can be given at meal times, not one hour before meals as is the usual practice with gentian violet.

G. Lapage

DEFICIENCY DISEASES

Fox, F. W. **The Agricultural Foundations of Nutrition. I. Introduction.** *South African Med. J.* 1954, Jan. 30, v. 28, No. 5, 97–8. **II. Food Resources in relation to Population.** *Ibid.*, Feb. 27, No. 9, 178–9, 2 figs. **III. Natural Limitations to the Production of Food.** *Ibid.*, Mar. 27, No. 13, 267–8, 1 fig. **IV. Some other Basic Aspects of Food Production.** *Ibid.*, Apr. 24, No. 17, 361–3. **V. Maize.** *Ibid.*, May 22, No. 21, 441–4, 5 figs. **VI. Wheat.** *Ibid.*, June 26, No. 26, 542–6, 3 figs. **VII. Pastoral Production: Meat.** *Ibid.*, July 31, No. 31, 649–53, 4 figs. **VIII. Dairy Produce, with special reference to Fresh Milk.** *Ibid.*, Sept. 4, No. 36, 770–73, 1 fig. **IX. Sea-Foods.** *Ibid.*, Oct. 16, No. 42, 897–9, 1 fig. **X. Vegetables.** *Ibid.*, Nov. 27, No. 48, 1019–22, 2 figs. **XI. Native Reserves and Locations.** *Ibid.*, 1955, Jan. 15, v. 29, No. 3, 63–6, 3 figs. **XII. Conclusion.** *Ibid.*, Mar. 19, No. 12, 282–4, 1 map.

The political and racial problems that have arisen in South Africa have aroused world-wide interest. However much there may be disagreement with the policy of the present government, there is no doubt about the difficulties that must confront any government in that country. Constructive and practical alternative policies are seldom put forward. Some of the basic difficulties with which the people of South Africa must contend are clearly set out in 12 articles published in the *South African Medical Journal* which provide a background picture to the political stage.

The population in 1951 consisted of some 2·6 million Europeans and 12·6 million of other races, which number includes coloured and Asians, but of whom the majority are Bantu. Of these latter 4 million live in reserves. The urban population consists of 2·0 million Europeans and 2·9 million non-Europeans. The remaining rural population is quite unable to feed this large industrial population and both urban and rural populations are increasing rapidly. Outside the native reserves 70 per cent. of the land is farmed by Europeans. The total area of these farms has increased only 5 per cent. in 25 years. Most of these farms are more suited to pastoral than arable farming. The land is thus better adapted to the production of meat, dairy products and wool than to the production of the basic cereals —maize and wheat. Maize production is falling behind consumption. At present small imports are necessary, but in 20 years' time it is estimated that total requirements will have risen from 25 to 40 million bags. Much of the land on which maize is now grown is showing signs of exhaustion. Wheat production is increasing, but crops are subject to wide seasonal variations and in bad years fall far below requirements and large imports are necessary. Although South Africa ranks fairly high as a meat-eating country, production of fresh milk is insufficient. The average consumption of the urban population is falling and is now less than half a pint per head per day. Of this many of the non-Europeans living on the poverty line get little or none.

In the native reserves the food position is bad. Production of maize is falling and food has to be imported. Many of the inhabitants leave the land for seasonal work in mines and industries outside the reserve. Ignorance of modern scientific agriculture is widespread.

Although South Africa is by no means a poor country agriculturally, expansion is limited by several factors. Notably there is the need for soil conservation. Much good land is becoming impoverished. The wide seasonal climatic variations make for instability in the economics of farming. There is as a result a drift from the land to apparently more

secure occupations in the towns. Future food supplies will only become secure if a sufficiency of the best brains and labour in the country is attracted to farming. A complete revolution in farming practices in the native reserves is necessary.

The papers deal for the most part with agricultural statistics which are national averages. Such figures can show little of the details of the distribution of the foodstuffs. Even with a good economic system, the country could not be well fed. As it is, large numbers of the non-Europeans live around the poverty line with hunger as a constant near neighbour. These are the conditions that breed political unrest. Unless the Bantu can become more productive both in agriculture and in industry, there will be neither a sufficiency of food grown in the Union nor the necessary wealth to purchase it abroad. Stability within the country cannot be achieved at present levels of production.

Dr. Fox has set out the agricultural state of the country clearly. The *South African Medical Journal* is to be congratulated on publishing the papers. In an editorial it is pointed out how agriculture determines health and that the people are affected with many nutritional disorders. Neither Dr. Fox nor the editorial attempt any detailed plan for stimulating and stabilizing farming in the Union. But they have put the problems in broad outline. South Africans and especially the medical profession cannot afford to neglect the challenge. Indeed, in the world today we are all implicated. The Union will head for disaster, in which other countries will be involved, unless both the knowledge and the will to work on the farms can be generated. *R. Passmore*

Henriquez Inclan, E., Rivas, R. & Arias, Olga. Signos avitaminósicos en enfermos Mexicanos. [**Signs of Vitamin Deficiency in Mexican Patients**] Revisión de 1,000 casos. *Medicina.* Mexico. 1955, Mar. 10, v. 35, No. 719, 112–17. [59 refs.]

Baptist, N. G. & de Mel, Beatrice V. **Growth and Amino-Acid Intakes of Children on a Cereal-Legume-Vegetable Diet.** *Brit. J. Nutrition.* 1955, v. 9, No. 2, 156–70. [41 refs.]

"1. After a preliminary observation period on a mixed diet containing animal protein, the heights and weights of twenty-three Ceylonese children aged 1–6 years attending a municipal crèche in Colombo were studied after they had been given an entirely vegetable diet or the same diet with a supplement of skim milk.

"2. No statistically significant difference was found between the two groups as a whole. However, the children between the ages of 3½ and 6 years on the entirely vegetable diet gained somewhat more in weight but decidedly less in height, not significantly so, however, perhaps in view of the short period of the trial. Moreover, it is felt on the available evidence that an increase in the calcium intake of Ceylonese children on rice diets would lead to improvement in height and general physique.

"3. The rate of increase of growth on a mixed diet containing animal protein but deficient in calories was significantly smaller ($P < 0{\cdot}01$) than on an entirely vegetable diet with higher calorie intake.

"4. The essential amino-acid content of the diets has been computed and approximate requirements for growth of children are suggested.

"5. It is concluded that a suitable mixture of vegetable proteins can support growth in children."

Best, C. H., Hartroft, W. S., Lucas, C. C. & Ridout, Jessie H. **Effects of Dietary Protein, Lipotropic Factors, and Re-Alimentation on Total Hepatic Lipids and their Distribution.** *Brit. Med. J.* 1955, June 18, 1439–44, 8 figs. on pl. [34 refs.]

It is well known that in kwashiorkor, the protein deficiency of infants, the liver may be fatty and that the stainable fat is found predominantly in the periportal regions. In choline deficiency in the rat the first appearance of stainable fat is, however, in the area around the central veins. This paper deals with experiments on rats in which the nature and amount of protein in the diet was varied whereas the choline supply was kept at an adequate level. The abnormal lipid which accumulated on diets insufficient in protein was found in the periportal regions as in human kwashiorkor. Another finding which shows a parallelism with the observations made in human kwashiorkor was that after a period of dietary protein deficiency re-introduction of adequate protein resulted in a transitory fatty liver, the demonstrable fat being exclusively periportal in distribution.

It seems, therefore, proved that, in rats at least, for complete protection of the liver cells in the portal regions protein is necessary in addition to choline.

The amount of protein depended upon its nature, fibrin being much more effective than casein and casein much better than soya protein. The protein inadequacy appeared to begin at levels below 6 per cent. of fibrin or below 12 per cent. of casein in the diet. Choline chloride inadequacy begins at about 0·12 per cent. *H. Lehmann*

HAEMATOLOGY

Gelfand, M. **A Case of Sickle-Cell Anaemia in an Indigenous African Child from Mashonaland.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, May, v. 49, No. 3, 268–70, 3 figs. on 2 pls.

This paper is the first to record a case of sickle-cell anaemia in a Bantu of exclusively South African origin. Both parents and grandparents belong to the Budja tribe which is indigenous to the Mtoko district of Mashonaland. The father showed slight sickling and in the mother's film there were a few doubtful cells which had sickle-cell shape. One sibling also showed the sickling phenomenon. Electrophoretic analysis of the patient's blood showed the pattern typical for homozygous S haemoglobin. *H. Lehmann*

Edington, G. M. **The Pathology of Sickle-Cell Disease in West Africa.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, May, v. 49, No. 3, 253–67, 8 figs. on 4 pls. [61 refs.]

There has been a scarcity of thorough investigations of the pathology of sickle-cell disease in Africa and for this reason this investigation which fills a gap is particularly welcome. Its first part consists in an analysis of the reports of 2,880 autopsies performed in Accra from 1929 to 1953. In not less than 92, death occurred in sickle-cell crisis and in an additional 12 there was found evidence of sickle-cell anaemia. In addition to discussing other organs, the author gives special attention to the appearance of the spleen. He makes very clear the difference between chronic sickle-cell anaemia with its small siderofibrotic spleen and sickle-cell crisis in which

evidence of previous sickle-cell disease is not necessarily found. The spleen in these patients must not necessarily be fibrotic and may be large and blue, firm and rubbery in consistency, not bleeding on section and weighing anything from 190 to over 1,400 gm. In addition to the analysis of 2,880 autopsies the author describes in detail 40 others in which the sickle-cell disease has played an important part in causing death. The small sidero-fibrotic spleen was present only in 5, the enlarged congested spleen in 35. Of 13 women who died suddenly in pregnancy in crisis only 4 showed siderofibrotic nodules in their spleens. In addition to these 13 women, there were 11 children—8 of whom showed no previous history suggestive of sickle-cell anaemia—and 14 other adults. One of these was a woman aged 38 years who gave a typical history of sickle-cell anaemia, and in her was found the typical small fibrosed spleen. Two other males died suddenly in crisis complaining of substernal pain and dyspnoea. In the remaining 11 adults sickling had not been considered as a possible factor in the cause of death and it was of interest to note that death occurred following minor trauma in one instance and during Evipan anaesthesia in another.

The author discusses the aetiology of sickle-cell crisis and notices that not all infants of the pregnant women showed the sickle-cell phenomenon, which suggests that the mothers were not homozygous for the sickle-cell gene. "This is a serious statement to make as it implies that 18 per cent. of the women in the Gold Coast are liable to die suddenly in crisis in pregnancy." While this work was performed electrophoretic analysis had just been introduced and it was applied in a few cases and indeed death was seen in one pregnant woman suffering from sickle-cell haemoglobin-C disease. Nevertheless one woman who died in crisis revealed the presence of the sickle-cell trait only even on electrophoretic analysis.

In the second half of 1950 all mothers and all babies delivered in the Maternity Hospital, Accra, were examined. They were tested for the sickle-cell trait, and a history was taken from each mother and the haemoglobin content of the blood was estimated. It appeared that in multigravidae the sickle-cell trait does not have a deleterious effect on fertility, nor are the children born of sickling mothers more likely to die in childhood than those of non-sickling mothers. It is thus obvious that many women with the sickling trait successfully survive pregnancy and the reason why a crisis occurs in any one pregnant woman with the sickle-cell trait and not in another remains obscure. [There is a most useful and comprehensive list of references.] *H. Lehmann*

Ponder, E. **The Specific Heat and the Heat of Compression of Human Red Cells, Sickled Red Cells, and Paracrystalline Rat Red Cells.** *J. General Physiol.* 1955, May 20, v. 38, No. 5, 575–80, 1 fig.

"The investigation of two thermal properties of red cells throws some light on whether sickling is a process involving the crystallization of a relatively insoluble hemoglobin. These properties are the specific heat and the heat of compression, both of which would be expected to become numerically less if the hemoglobin of the red cell were to crystallize. In the case of paracrystalline rat red cells, which give spacings at 45 A and 58 A by x-ray diffraction, the specific heat is reduced to 85 per cent of that of the normal red cells, and the heat of compression is only about 75 per cent of that found for the normal red cell. In the case of the red cell sickled by a reduction of the O_2 tension, the specific heat and the heat of compression are substantially the same as found for the normal red cell. This is an argument against sickling being the result of a crystallization

process, and supports the observation that sickled cells do not give x-ray spacings. The result is compatible, on the other hand, with sicklings being the result of the formation of an oriented and birefringent gel."

Becklake, Margaret R., Griffiths, S. B., McGregor, M., Goldman, H. I. & Schreve, J. P. **Oxygen Dissociation Curves in Sickle Cell Anemia and in Subjects with the Sickle Cell Trait.** *J. Clin. Investigation.* 1955, May, v. 34, No. 5, 751–5, 1 fig. [16 refs.]

"1. The oxygen dissociation curve of blood from 4 cases of sickle cell anemia studied by the *in vitro* tonometer method was significantly displaced to the right of the dissociation curve of blood from 10 normal subjects.

"2. The oxygen dissociation curve of blood from 7 cases of sickle cell trait studied by the same method showed no such significant displacement.

"3. These observations in conjunction with the work of Wyman, Allen, and Smith (15, 16) on the oxygen affinity of dialyzed solutions of sickle and normal hemoglobin are consistent with the hypothesis that this difference in oxygen affinity is due to dialyzable factors, *i.e.*, the serum environment of the cell rather than actual differences between the affinity of normal and sickle anemia hemoglobin for oxygen."

James, G. W. & Abbott, L. D., Jr. **Erythrocyte Destruction in Sickle-Cell Anemia: Simultaneous N^{15}-Hemin and N^{15}-Stercobilin Studies.** *Proc. Soc. Exper. Biol. & Med.* 1955, Mar., v. 88, No. 3, 398–402, 2 figs. [24 refs.]

"1. Study of erythrocyte destruction in sickle-cell anemia by analysis of hemin N^{15} disappearance and fecal stercobilin N^{15} appearance after a 1 g dose of N^{15}-glycine indicates a completely random destruction of circulating red cells. 2. This individual's cells had a half-life of 11 days indicating a turnover rate of 6·3% per day with a mean survival time of approximately 16 days. 3. There was no evidence of more than one population of cells. 4. Comparison with a similar study by London and coworkers shows a similar clinical condition but a physiological state twice as active, and further suggests still unknown factors involved in the destruction of circulating red cells in this type of hemolytic anemia."

Portier, A., Massonnat, J. & Thiebault, R. Enquêtes systématiques sur la drépanocytose chez l'indigène musulman algérien. (Premiers résultats.) [**Systematic Investigation of Drepanocytosis in Algerian Muslims: First Results**] *Algérie Méd.* 1954, Feb., v. 58, No. 2, 185–91, 2 figs. [13 refs.]

The authors have discovered a family with microdrepanocytic disease in Algeria. They have also tested 292 patients of whom 11 showed the sickle cell trait. Only one of them was a Negro. The others showed no Negroid characteristics and were typical of the indigenous people of Algeria.

H. Lehmann

Boturão, E. & Simões, B. C. Doença microdrepanocítica ou Doença de Silvestroni. Primeiros casos brasileiros. [**First Cases of Microdrepanocytic Disease (Silvestroni's Disease) in Brazil**] *Med. Cirurg. Farmacia.* 1954, Apr., No. 216, 155–64, 5 figs. & 1 chart. [17 refs.]

An account of two cases [see this *Bulletin*, 1952, v. 49, 794].

Singer, K., Singer, Lily & Goldberg, S. R. **Studies on Abnormal Hemoglobins. XI. Sickle Cell-Thalassemia Disease in the Negro. The Significance of the S + A + F and S + A Patterns obtained by Hemoglobin Analysis.** *Blood.* 1955, May, v. 10, No. 5, 405–15, 5 figs. [34 refs.]

"(1) Four Negro patients with mild sickle cell-thalassemia disease (heterozygous for the genes for S hemoglobin and for thalassemia) are described. In contrast to reports in the literature, some of these patients are only mildly anemic, or not anemic at all. In three, the values for MCV and MCH are decreased, but in one, all hematologic indices are normal. All four individuals show leptocytosis and elevated reticulocyte levels.

"(2) Hemoglobin analyses, consisting of a combination of electrophoresis and the alkali denaturation technic, demonstrate the S + A + F pattern in three, and the S + A pattern in the fourth. These patterns are considered pathognomonic for sickle cell-thalassemia disease. They may be sharply differentiated from the S + F pattern, encountered in classical (homozygous) sickle cell anemia, and from the A + S pattern found in the heterozygous sickle cell trait. The various types of hemoglobin are reported in the sequence of their quantitative representation in the hemolysate. Hemoglobin analysis is indispensable for the recognition of the different types of sickle cell disease.

"(3) Evidence is cited that clinically almost asymptomatic sickle cell-thalassemia disease is probably not too rare in the American Negro population.

"(4) The genetic aspects of the production of fetal hemoglobin are discussed. It is postulated that the production of fetal hemoglobin is also under genetic control. The genes for fetal hemoglobin are not alleles of the genes for normal adult hemoglobin and are physiologically almost completely suppressed by the latter. Pathologic genes may render this suppression incomplete."

Sturgeon, P., Itano, H. A. & Bergren, W. R. **Clinical Manifestations of Inherited Abnormal Hemoglobins. I. The Interaction of Hemoglobin-S with Hemoglobin-D. II. Interaction of Hemoglobin-E and Thalassemia Trait.** *Blood.* 1955, May, v. 10, No. 5, 389–404, 7 figs. [34 refs.]

I. "A clinical and hematologic description is presented of the family demonstrating the existence of the genetically determined hemoglobin-D originally described by Itano.

"The interaction of hemoglobin-D with hemoglobin-S in two members of this family has resulted in a hemolytic process and a mild anemia. Clinically, one of the patients is asymptomatic. The other has repeated painful episodes characteristic of those seen in sickle cell crises.

"Clinical and hematologic evaluations of two members of the family inheriting normal hemoglobin and hemoglobin-D revealed no abnormalities.

"The only feature of hemoglobin-D which distinguishes it from normal hemoglobin is its electrophoretic mobility which is similar to that of hemoglobin-S. Hemoglobin-D is distinguished from hemoglobin-S by a higher solubility and by a failure to sickle and from hemoglobin-C by a lack of target cell formation and a different electrophoretic mobility."

II. "Clinical, hematologic and special hemoglobin studies are presented

of a family exhibiting a new abnormal hemoglobin (hemoglobin-E). Its interaction with thalassemia trait in one of its members also is described.

"Hemoglobin-E does not sickle; under alkaline conditions it migrates slowly at a rate comparable to hemoglobin-C, while at an acid pH it migrates at a rate similar to hemoglobin-S.

"The result of its interaction with thalassemia is a microcytic, hypochromic anemia clinically resembling thalassemia major of an intermediate degree of severity. The major defect appears to be in hemoglobin synthesis, although the slight persistent reticulocytosis suggests a mild hemolytic process."

Portier, A., Mussini-Montpellier, Cabannes, R. & Massonnat, J. Les manifestations hépatiques de la thalassémie. [**Hepatic Manifestations of Thalassaemia**] *Algéric Méd.* 1954, Feb., v. 58, No. 2, 177–84. [24 refs.]

This paper surveys the manifestations of liver disease in thalassaemia. All varieties of disorder can occur: frank obstructive jaundice or straight cirrhosis as well as Banti's syndrome. Nearly all aspects of liver disorder can be explained by excessive haemolysis. *H. Lehmann*

EPIDEMIC DROPSY

del Vecchio, P. Intossicazione collettiva da olio di "Argemone mexicana" (idropisia epidemica). Nota I. [**Communal Poisoning from the Oil of "*Argemone mexicana*" (Epidemic Dropsy)**] *Igiene e San. Pubblica.* Rome. 1954, July–Aug., v. 10, Nos. 7/8, 390–99, 3 figs. English summary.

Argemone mexicana is a plant belonging to the Papaveraceae and grows wild in Eritrea, where it has appeared in the last 10 years or so, and del Vecchio gives a short account of its morphology and habits. Pressure of its seeds yields an oil which has emetic, cathartic, toxic and caustic properties and which has been used for industrial purposes, more especially since the end of the last war when oils and fats were scarce.

The outbreak of poisoning which forms the subject of this paper occurred in Asmara and involved a total of 76 persons, both African and European; 60 were inmates of a Cistercian monastery and 17 of these had to be admitted to hospital. The signs and symptoms included cardiovascular weakness, severe asthenia, gastro-enteritis, diffuse rashes in 60 per cent. of cases and marked oedema of the lower limbs and of the face. The incubation period was 30–40 days. One young patient, aged 11 years, died the day after admission to hospital and the post-mortem findings are briefly reported. All the other patients recovered in 60–90 days.

The cause was shown to be a consignment or batch of edible oil manufactured by a local firm in a press which had been also used for the extraction of argemone seed oil; 9 out of 15 suspected samples of edible oil sold by this firm were found to be adulterated by 0·10 to 0·40 per cent.: the technique used for the analyses was a slight modification of what Chaudhuri and Chakravarty [this *Bulletin*, 1950, v. 47, 1029] developed in India, where poisoning by this oil is well known and a severe outbreak

occurred in Calcutta in 1934. Eleven samples of edible oil manufactured by other Asmara manufacturers were analysed at about the same time and were all found genuine and wholesome and fit for human consumption.

Del Vecchio discusses the mechanism of adulteration which must have taken place in the oil-pressing plant and makes certain recommendations to prevent the trouble. Oil manufacturers in Eritrea now have to apply for separate licences if they wish to press more than one kind of seed, and separate plants may be required. *J. Cauchi*

VENOMS AND ANTIVENENES

Lipparoni, E. Rilievi vari sull'ofidismo del Medio Uebi Scebeli. [**Snake Bite in the Middle Webi Djehbel**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1954, Dec., v. 35, No. 12, 645–58. [39 refs.] English summary (8 lines).

The author writes in the light of his 21 years' experience of medical practice in this part of Somaliland, and he briefly refers to the habits of such poisonous species of snakes as have been identified locally. These are *Tharbophis obtusus*, *Ramphophis rubropunctatus*, *Aparallactus concolor Boulangeri*, *Naja haiae*, *N. nigricollis*, *N. melanoleuca*, *Causus resimus*, *Bitis arietans*, *Echis carinatus*, *Atractaspis microlepidota*, *A. microlepidota magrettii* and possibly *Dispholidus typus*. The "mamba", which is so dreaded in other parts of Africa, does not seem to have been encountered in this region. Of harmless local species the author records *Typhlops unitaeniatus ataeniatus*, *Erix colubrinus*, *Coronella somalica* and *Asthenophis ruspolii*.

Of a total of 89 cases of snake bite in the period May 1934–December 1954, 82 were treated in hospital, and 7, one of whom was a European woman, at home; 52 of the patients were men. There were 2 fatal cases, one being that of a 5-year-old child who had been bitten on lip, arm and forearm while asleep and whose brother was then bitten by the same snake but recovered after necrosis of the hand where the bite was.

Lipparoni refers briefly to various remedies used in native treatment of snake bite. He mentions the pathological lesions which he has observed in his cases and points out that one or more hours often elapsed before he had seen the patient; he thinks that about 1 in 5 would have recovered without any treatment. In only a few of the cases could the species, or even the genus, of the biter be identified and he believes that a polyvalent antivenene which has been prepared against the East African poisonous species is the best treatment. An initial dose of 20 cc. (10 cc. for children) is given subcutaneously and the dose is repeated as necessary up to an aggregate maximum of 200 cc. in very severe cases; the intravenous route may have to be used when exceptionally rapid action is called for. Antibiotic treatment, and even antitetanus serum, may have to be given against secondary infection. The author deals briefly with less specific lines of supplementary treatment, both local and general, and discusses such preventive measures as the protection of fauna, *e.g.*, iguanas and certain herons, which attack snakes, and he mentions certain personal habits and precautions which residents in snake-infested countries learn to adopt against the risk.

J. Cauchi

Maretić, Z. & Stanić, M. **The Health Problem of Arachnidism.** *Bull. World Health Organization.* Geneva. 1954, v. 11, No. 6, 1007–22. [23 refs.]

The distribution of the species of the venomous spider *Latrodectus* is outlined. In Europe the common agent is the female *L. tredecimguttatus* which nests principally in wheat and bushes and in ditches under stones and not, according to the authors, in privies and houses. Most bites in Yugoslavia are recorded during harvesting and threshing, commonly on the volar side of the left radiocarpal articulation, used in binding sheaves. Before 1948 no accidents with *Latrodectus* were reported in Istria. Between then and 1953, more than 180 cases occurred among about 30,000 inhabitants in an area in parts of which " specimens (of *Latrodectus*) may be collected from almost every square yard ".

A good account of the clinical features of *Latrodectus* poisoning is given. The bite itself is usually insignificant and dramatic symptoms may develop in persons who are unaware of having been bitten. The patient becomes anxious, restless and is often impelled to walk about; there may be convulsions. (The author suggests that dancing as a cure for spider bite gave rise to the " tarantella ".) He feels severe pains in the abdomen, the lumbar region and extremities. Pains especially in the legs and feet may persist for several days. Profuse salivation is common. Vomiting may be profuse. The liver may be enlarged and the serum bilirubin raised. The blood pressure is usually raised. There is early tachycardia often followed by bradycardia. Oliguria and albuminuria are common.

A scarlatinoid rash, generalized or localized to the abdomen, chest or vicinity of the bite, develops in severe cases some days after the bite.

Symptoms last about a week. Convalescence is slow.

The most successful treatment is the combination of intravenous injection of antivenin (prepared by the authors from sheep or rabbits), calcium salts, and local infiltration of the bitten area with procaine.

Control of arachnidism is most satisfactorily effected by mechanical destruction of spiders. Control by insecticides is problematical.

Experimental investigations are described on the toxicology of *Latrodectus* venom in rats, mice, cats, guineapigs, rabbits, dogs, a horse, and cold-blooded animals. The venoms of all species of the spider have similar properties; the signs vary in intensity from animal to animal. The camel and horse are especially susceptible. Dogs, turtles and lizards are resistant. The venom is essentially neurotropic and is said to be 15 times as powerful as that of rattlesnake. Antivenin made from the venom of *L. tredecimguttatus* was active against the venom of *L. mactans* and *L. hasselti.*

B. G. Maegraith

Abalos, J. W. Descripción de una nueva especie de *Tityus* (Buthidae, Scorpiones). [**A New Species of Scorpion** (*Tityus*)] *An. Inst. Med. Regional.* Tucuman. 1954, Dec., v. 4, No. 1, 107–13, 15 figs.

The English summary appended to the paper is as follows:—

" *Tityus proseni* sp. n. is described and figured in detail, the description being based on specimens from Locotal, Chapare, Bolivia. The species is included in the ' K ' group of *Tityus* Mello Leitao (1945). The new species is compared with *Tityus nematochirus* Mello Leitao, 1940."

TOXOPLASMOSIS

Giroud, P. & Jadin, J. Réactions allergiques vis-à-vis de l'antigène pulmonaire toxoplasmique chez des Africains vivant dans la province du Kivu (Congo belge). [**Allergic Reactions to *Toxoplasma* Antigen (Rabbit-Lung) in Africans of the Kivu Province, Belgian Congo**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 6, 759–61.

It is well known that rats infected by toxoplasms tend to undergo abortion; it is also known that toxoplasms are present in the Belgian Congo. Assuming that the human race behaves in the same way to toxoplasm infection as do rats, in order to determine whether the falling birth rate in the Belgian Congo has any relationship to toxoplasm infection the authors made a skin antigen from rabbit lung infected with toxoplasms. Roughly one half of 91 people tested with this antigen gave positive reactions, the highest proportion being in laboratory workers, many of whom might have come into contact with toxoplasms during their experimental animal work. The authors conclude that with this evidence it would be interesting to undertake an epidemiological survey for toxoplasmosis in the province of Kivu. *I. A. B. Cathie*

Michel, F., Pulver, W. & Huber, H. Klinischer Beitrag zur akuten Erwachsenen-Toxoplasmose. Behandlung mit Erythromycin. [**Clinical Study of Acute Toxoplasmosis in an Adult. Treatment with Erythromycin**] *Schweiz. med. Woch.* 1955, May 14, v. 85, No. 20, 488–92, 4 figs. [Numerous refs.]

The following is a translation of the authors' summary:—

After a review of adult toxoplasmosis the authors describe a case of their own. It concerns an acute febrile condition in a man of 39, with encephalitis, lymphocytic meningitis, double pneumonia, hepatorenal syndrome, myocarditis and an affection of both eyes. The Sabin-Feldman dye test was strongly positive (1 in 1,024). After treatment with 1·2 gm. of erythromycin daily for 10 days, healing of the toxoplasmosis occurred: nevertheless, blindness remained as a sequel of the toxoplasma affection of the eyes. After treatment the Sabin-Feldman test fell to a titre of 1 in 64 within 4 months.

H. J. O'D. Burke-Gaffney

Lapierre, J., Larivière, M. & Gilles, R. Action de différents antibiotiques vis à vis de la toxoplasmose expérimentale de la souris (Erythromycine, Magnamycine, Sulfadimérazine). [**Action of Erythromycin, Carbomycin and Sulphadimerazine on Experimental Toxoplasmosis in Mice**] *Ann. Parasit. Humaine et Comparée.* 1955, v. 30, Nos. 1/2, 153–5.

The following is a translation of the authors' summary:—

Our experiments indicate that erythromycin, magnamycin [carbomycin] and sulphadimerazine [dimethyl derivative of sulphadimerazine] are ineffective in the treatment of experimental toxoplasmosis in mice and proved themselves incapable of modifying its course [but see Bogacz, this *Bulletin*, 1955, v. 52, 85; and Summers, *ibid.*, 1950, v. 47, 407].

H. J. O'D. Burke-Gaffney

DERMATOLOGY AND FUNGUS DISEASES

Kemper, H. Experimentelle Untersuchungen über die durch Afterwolle von *Euproctis chrysorrhoea* (Lepidoptera) erzeugte Dermatitis, verglichen mit der Wirkung von Arthropodenstichen. [**Experimental Studies on Dermatitis Produced by Bristles of *Euproctis chrysorrhoea*, compared with the Effect of Arthropod Bites**] *Ztschr. f. Angewandte Zool.* 1955, No. 1, 37–59, 4 figs. [16 refs.]

Eleven volunteers were subjected to exposure to the bristles of the caterpillar of the moth *Euproctis chrysorrhoea*, which is known to produce dermatitis. Four were not sensitive to the first exposure, but 3 were soon sensitized. An account of the reaction is given, and of the structure of the bristles of the caterpillar. The mechanism of the reaction is discussed.

Kenneth Mellanby

TROPICAL OPHTHALMOLOGY

Kamiya, S. & Hujii, A. **Trachoma Control with Aureomycin in Nara Prefecture Japan. Part 1. Statistical Background on the Classification of the Stages of Trachoma.** *Rev. Internat. du Trachome.* 1955, v. 32, No. 2, 193–214, 6 figs.

Pannarale, M. R. Résultats de la thérapie erythromycinique dans le trachome. Recherches microbiologiques et cliniques. [**Results of Treatment of Trachoma by Erythromycin. Microbiological and Clinical Researches**] *Rev. Internat. du Trachome.* 1955, v. 32, No. 2, 215–32. [15 refs.]

The author, from Parma, Italy, describes the treatment of trachoma with erythromycin either in the form of a 1 per cent. ointment applied 5 times daily or as tablets (6 mgm./kgm. of body weight every 8 hours). In a preliminary trial, 7 patients received these treatments separately or together. In a second series, 14 patients received the ointment only and in a third, 8 patients had tablets only. The results are shown in detail in tables and discussed at length. Finally, 4 patients received the combined treatment. Treatment was continued for 15 to 70 days.

The Halbertstaedter-Prowazek bodies degenerated and disappeared in 2 days. together with associated bacteria. Acute trachoma healed in 6 days and corneal lesions in 15. Conjunctival nodules and papillae disappeared in 2 months.

There was no appreciable difference between local, parenteral and combined treatments, but local treatment is advised for acute cases.

H. J. O'D. Burke-Gaffney

See also p. 919, D'Haussy *et al.* L'onchocercose en A.O.F. L'onchocercose oculaire. [**Ocular Onchocerciasis in French West Africa**] *Bull. Méd. de l'Afrique Occidentale Française.* 1954, Nov., No. 2, Special No., 111–39, 15 figs. (5 coloured) on 6 pls.

See also p. 919, Burch, Proyecto piloto de una campaña de tratamiento médico de la oncocercosis, basado en la administración de suramina sódica (U.S.P. XIII). Parte I. Encuesta pretratamiento. [**Pilot Project for a Medical Treatment Campaign against Onchocerciasis based upon the Administration of Suramin Sodium (USP XIII). Part I. Pretreatment Survey**] *Bol. Oficina Sanitaria Panamericana.* 1955, Jan., v. 38, No. 1, 20–25.

HEAT STROKE AND ALLIED CONDITIONS

Lotte, A. J. Contribution à l'étude du préjugé en médecine: le casque colonial. [**Observations on "Prejudice in Medicine": the Tropical Helmet**] *Méd. Trop.* Marseilles. 1955, Jan.–Feb., v. 15, No. 1, 36–44.

This paper is a dissertation on the tropical helmet, the French "*casque colonial*" or topee (sola topee, pith helmet). It is written in a half-humorous, sarcastic, and at times philosophical vein. The arguments against the outmoded ideas of head protection, which are now quite familiar, are set forth. From every point of view, efforts to retain the *casque* in preference to the straw hat or panama are sentimental.

There are so many physiological data on thermogenesis and sweat-evaporation that in order to do this paper full justice a liberal translation would have to be made: but most of this information is available elsewhere and more fully in the numerous recent papers on effects of heat on the human body.

Philip Manson-Bahr

MISCELLANEOUS DISEASES

Tredre, R. F. **The Inflammatory Diseases of the Bowel.** Ross Institute Industrial Advisory Committee: Information and Advisory Service. London School of Hygiene and Tropical Medicine. 1955, Mar., Bull. No. 9, 18 pp., 5 diagrams.

This bulletin, specially written for non-medical persons, is one of a series the object of which is to keep tropical industry informed of the progress of medical knowledge, and of the practical methods by which the greatest benefit may be obtained from its application. After a brief description of the alimentary canal the carrier problem is discussed and then follow brief accounts of the features of cholera, typhoid fever, bacillary and amoebic dysentery. The bulletin concludes with a sound exposition of the factors concerned in the transmission and control of inflammatory intestinal diseases.

Throughout, the bulletin is lucidly written and contains an abundance of good advice. Those who read it cannot fail to benefit from it and it is to be hoped that it will have a wide circulation. If Dr. Tredre's advice regarding the avoidance of salads were alone taken by those residing in the tropics much ill-health due to bowel disorders would be avoided.

A. W. Woodruff

Hassall, C. H. & Reyle, K. **Hypoglycin A and B, Two Biologically Active Polypeptides from** *Blighia sapida*. *Biochem. J.* 1955, June, v. 60, No. 2, 334–9, 1 fig. [25 refs.]

"1. Two peptides, hypoglycin A (a neutral compound, m.p. 280–284°; $[\alpha]_D^{32}$ + 9·2 ± 2°) and hypoglycin B (an acid, double m.p. 194–195°, 200–206°; $[\alpha]_D^{32}$ + 9·6 ± 2°; neutralization equiv. 175) have been isolated from the unripe seeds of *Blighia sapida*.

"2. The aqueous extract of the seeds, which contains some fourteen ninhydrin-positive compounds in addition to hypoglycin A and B, was fractionated by means of the Amberlite ion-exchange resins IR-120, IRC-50 and IR-4B. The isolation of hypoglycin A and B was followed by toxicity tests using kittens and albino rats.

"3. The hypoglycaemic activity of the peptides is circumstantial evidence of a connexion between the Jamaican disease 'vomiting sickness' and the practice of eating the fruit of *Blighia sapida*.

"4. Hypoglycin A, but not hypoglycin B, occurs in the arillus of the fruit. The unripe arillus contains a very much higher concentration of hypoglycin A than the ripe arillus."

PARASITOLOGY: GENERAL

Dias, J. A. T. S. Panorama noso-parasitológico veterinário em Moçambique. [**Parasitic Diseases of Veterinary Importance in Mozambique**] *Anais Inst. Med. Trop.* Lisbon. 1954, Sept.–Dec., v. 11, Nos. 3/4, 605–34. English summary. [47 refs.]

Baugé, R. Fréquence du parasitisme intestinal humain en février-mai 1953, dans la région de Hongay (Nord-Vietnam). [**Incidence of Intestinal Parasites in Hongay Region, North Vietnam, in February–May 1953**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 5, 720–28, 1 chart.

In the Hongay region (North Vietnam) 730 faecal examinations of hospital patients were carried out in the first half of 1953, by means of the concentration technique of Telemann-Rivas. The parasitic infections and the number of times they were found are as follows: *Trichuris trichiura* (*sic*, *Trichocephale*), 494; *Ascaris lumbricoides*, 398; *Ancylostoma* (*sic*, *Ankylostome*), 175; *Entamoeba histolytica* (*sic*, *E. dysenteriae*), 112, in the cystic form, 92 times; *Fasciolopsis buski*, 87; *E. coli* (cysts), 60; *Giardia intestinalis* (*sic*, *Lamblia*), 35; *Chilomastix*, 13; *Clonorchis sinensis*, 10; *Strongyloides stercoralis* ? (*sic*, *Anguillules*), 4; *Necator americanus*, 3; *Taenia*, 2; *E. vermicularis* (*sic*, *Oxyure*), 1. [The differentiation of *Ancylostoma* from *Necator* by faecal examination is highly questionable and diagnosis of *Taenia* and *Enterobius* by this method does not give a true figure.]

The patients examined comprised 556 Asians, 139 Europeans, and 35 Africans. The percentage infection rate among Asians was: *Ascaris*, 61·5; *Trichuris*, 55·6; hookworm, 24·5; *F. buski*, 14·7; *E. histolytica*, 10; *E. coli*, 6; *Giardia*, 2·7; *Chilomastix*, 1; *Clonorchis*, 1; among Europeans, *Ascaris*, 14·4; *Trichuris*, 56·1; hookworm, 13; *F. buski*, 2·8; *E. histolytica*, 15·8; *E. coli*, 10·8; *Giardia*, 7·2; *Chilomastix*, 2·8; *Strongyloides*, 1·4; among Africans, *Ascaris*, 25·7; *Trichuris*, 71·4; hookworm, 51; *E. histolytica*, 23; *Giardia*, 5·7.

J. J. C. Buckley

Bellelli, L., Ciauri, G. & Mastrandrea, G. Il comportamento delle prove di labilità colloidale nel corso di alcune parassitosi intestinali. [**Results of Colloidal Lability Tests during Various Intestinal Parasitic Infections**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1955, Feb., v. 36, No. 2, 53–64. [19 refs.]

The English summary appended to the paper is as follows:—

" The authors have ascertained in some parasitic diseases of the digestive system (ascariasis, oxyuriasis associated with ascariasis, taeniasis, lambliasis and ankylostomiasis) a derangement of the protein balance in plasma.

" This derangement was proved by positive tests of colloidal lability and is probably related to an insufficient absorption or to an inadequate intake of the substances necessary to plasma protein synthesis following anatomical or functional changes, due to the parasitosis, in tracts of the gastro-enteric canal.

" This unbalance in plasma proteins, is found in individuals suffering from parasitic diseases since a long time and being in poor general health conditions."

Horkin, S. M. & Horkin, J. **Stain for Intestinal Protozoa in Wet Mount.** *Amer. J. Clin. Path.* 1955, Apr., v. 25, No. 4, 466.

The authors, from Los Angeles, describe a method of staining wet preparations which permits rapid identification of intestinal protozoa (the stain can also be used for dried specimens on a slide).

The stain employed is prepared as follows:

To 200 ml. water are added 12·5 gm. sodium sulphate, dissolved by mixing. To this solution is added 33·3 ml. glacial acetic acid, followed by 200 mgm. Neutral Red. After thorough mixing, 200 mgm. Light Green S.F. Yellowish is added, and the whole solution shaken and filtered. Further filtration is unnecessary as the stain is stable.

For use, a small drop of stain is mixed with a suspension of stool which is made in a drop of saline about twice as large as the drop of stain. Penetration is immediate, but nuclear and cytoplasmic details are best observed after " a few minutes ".

No distortion of cellular elements occur. [The appearances of the stained preparation are not described.] *H. J. O'D. Burke-Gaffney*

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

Brauns, A. Terricole Dipterenlarven. [**Larvae of Diptera of Woodland Soils**]

———. Puppen terricoler Dipterenlarven. [**Pupae of Diptera of Woodland Soils**]

Mattingly, P. F. & Brown, E. S. **The Mosquitos (Diptera: Culicidae) of the Seychelles.** *Bull. Entom. Res.* 1955, Apr., v. 46, Pt. 1, 69–110, 11 text figs. & 10 figs. on 3 pls. [Numerous refs.]

A provisional faunal list is given which is based on all collections of mosquitoes so far made in the Seychelles and enumerated by the authors. The latest collection was made by one of the authors [E.S.B.] from January 1952 to April 1953. It is hoped that future collections will reveal additional elements in the mosquito fauna and also the early stages of species for which these are still unknown and it is suggested that the plant-axil fauna has not yet been fully explored. At present the list stands as follows: *Uranotaenia pandani*, *U. nepenthes*, *U. browni* sp. n., *Taeniorhynchus uniformis*, *Aëdes vigilax vansomerenae* ssp. n., *A. aegypti*, *A. albopictus*, *A. albocephalus*, *A. pembaensis*, *Culex stellatus*, *C. simpsoni*, *C. fatigans*, *C. scotti*.

In the taxonomic part of the paper descriptions are given of the male, female, pupa and larva of the new forms indicated above and the first full descriptions are given of the male terminalia and pupae of certain other species. *Culex fatigans* is treated as a subspecies of *C. pipiens*, as recent work in the U.S.A. appears to indicate that it can and does interbreed in nature with *C. pipiens pipiens*. It is also pointed out that no specimens of *Aëdes aegypti* were collected this time; it may have been eradicated. Distribution records are listed and the zoogeography of the species is discussed.

In the section on bionomics and local distribution a brief description is given of the islands, also a classified enumeration of the habitat types and a discussion of the species predominating in each. Running water produced no mosquitoes and leaf axils were not systematically studied.

In two appendices notes are given on the mosquitoes which occur in other islands in the western Indian Ocean and important corrections are proposed to Hopkins's [this *Bulletin*, 1953, v. 50, 870] key for the identification of larvae of species of *Culex* of the Ethiopian region. *H. S. Leeson*

Cook, D. R. & Foote, R. H. **Pictorial Keys to the Mosquitoes of Medical Importance. IX. Australian Region.** *Mosquito News.* 1955, Mar., v. 15, No. 1, 35–8, 2 figs.

The authors present keys to the full grown larvae and to the females of the mosquitoes of medical importance in the Australian region. The area includes Australia, New Zealand, Polynesia, Micronesia, Melanesia, New Guinea, Moluccas and Timor. The species illustrated are *Anopheles subpictus*, *A. farauti*, *A. punctulatus*, *A. bancrofti*, *A. annulipes*, *Aëdes aegypti*, *Aëdes albopictus* and *Aëdes scutellaris*. Where larvae cannot be separated from other species these are indicated. Altogether there are about 40 anopheline and 360 non-anopheline mosquitoes in the region but only those named are felt to be of primary medical importance. *H. S. Leeson*

Halcrow, J. G. **Notes on a Laboratory Colony of** *Aedes* (*Stegomyia*) *albopictus* **(Skuse) and its Distribution in Mauritius.** *Proc. Roy. Entom. Soc. of London.* Ser. A. 1955, Mar. 25. v. 30, Pts. 1/3, 40–42.

In Mauritius *Aëdes albopictus* occurs from sea level to 2,000 feet. It breeds in holes in mango, flamboyant and papaya trees and sometimes in

basaltic depressions. It feeds by day, out of doors, especially in forest, and it is thought to be the local vector of dengue.

These notes on the establishment and maintenance of a laboratory colony of this mosquito follow closely the present practice for *A. aegypti*, the chief features of which are the drying of the eggs on filter paper and their storage for use later. Eggs of *A. albopictus* were viable after 88 days of storage but not after 100 days. *H. S. Leeson*

Brown, A. W. A. **Effect of Clothing Color on Mosquito Attack on Exposed Skin.** *J. Econom. Entom.* 1955, Apr., v. 48, No. 2, 130.

These tests were made in spruce forest, Goose Bay, Labrador, where mosquitoes were abundant and consisted mainly of *Aëdes communis*, *A. punctor*, *A. pionips* and *A. fitchii*. Four types of clothing were tested, 2 were attractive cloths, a black drill overall and a serge air force blue battle-dress. The other 2 were unattractive, a white drill overall and a green nylon " insect suit ". No head covering was worn.

The landing rates of the mosquitoes on the backs and faces of the wearers of the 4 colours are shown in a table. They indicate that the total number of landings on the face, as well as on the back, were lower with the green and white cloths than with the blue and black. But the ratio between the landing rate on the face and that on the back was higher with unattractive clothing than with attractive clothing. This suggests that the expected diminution in the swarm around an unattractively clothed person is partially offset by a greater portion of the swarm proceeding to the face. However, the author concludes that lighter coloured clothing does not increase the attack of mosquitoes on the face, although a significant decrease was obtained only with white versus black. *H. S. Leeson*

See also p. 919, Chow *et al.*, **Control of** *Salvinia*—**a Host Plant of** *Mansonia* **Mosquitos.** *Bull. World Health Organization.* Geneva. 1955. v. 12, No. 3, 365–9.

Burchfield, H. P. & Hartzell, A. **A New Bioassay Method for Evaluation of Insecticide Residues.** *J. Econom. Entom.* 1955, Apr., v. 48, No. 2, 210–14, 2 figs. [24 refs.]

The ability of mosquito larvae to move away from a light source is reduced by the presence of insecticides long before death occurs; thus a new procedure is proposed when mosquito larvae are used as test organisms to detect the presence of insecticides. It is called the photomigration test and is here described in detail. It provides a useful supplement to established methods of chemical analysis particularly when the nature and amount of the insecticidal residue are unknown.

Larvae which migrate beyond a fixed point in a period of a minute are regarded as unaffected; those which fail to do so are regarded as moribund. This classification is independent of the judgement of the operator. The time required for inhibiting 50 per cent. of the larvae is used as the criterion of response. Results can often be obtained in a few hours instead of the 24–48 hours required for most serial dilution methods. *H. S. Leeson*

Konecky, M. S. & Mitlin, N. **Chemical Impairment of Development in House Flies.** *J. Econom. Entom.* 1955, Apr., v. 48, No. 2, 219–20.

Eggs of *Musca domestica* were placed in rearing medium treated with certain chemical compounds. Observations were made throughout the

entire developmental cycle and the effects of these compounds tested at different concentrations are given in tables. Some showed delayed pupation or decreased emergence, some complete inhibition of larval development and some had no apparent effect. No decrease in egg viability was observed.

The results indicate that measurements other than knockdown and kill can be used as criteria in the search for chemicals to control insects.

H. S. Leeson

Hopkins, T. L. & Hoffman, R. A. **Effectiveness of Dilan and Certain Candidate Synergists against DDT-Resistant House Flies.** *J. Econom. Entom.* 1955, Apr., v. 48, No. 2, 146–7.

In the course of screening chemicals as synergists with organic phosphorus compounds a number of materials were found to increase the effectiveness of DDT against DDT-resistant house-flies. Compounds demonstrating greatest activity with Dilan were pyrethrum synergists or materials chemically similar to them. A total of 30 synergists in combination with Dilan were tested. Dilan and the candidate synergists when tested separately caused no mortality to flies at the dosages used. Several gave high initial mortality with Dilan and 3 were outstanding for residual effectiveness: piperonyl butoxide, the alpha-prophylpiperonyl ester of propionic acid and the alpha-allyl piperonyl ester of senecoic acid.

Piperonyl butoxide was also shown to increase the effectiveness of Dilan by treatment of flies with piperonyl butoxide and Dilan separately and combined, and also by piperonyl butoxide followed by Dilan after various intervals from 5 minutes to 24 hours later. *H. S. Leeson*

Baker, W. C. & Schoof, H. F. **Prevention and Control of Fly Breeding in Animal Carcasses.** *J. Econom. Entom.* 1955, Apr., v. 48, No. 2, 181–3.

"Dog carcasses were treated with emulsion applications of dieldrin, endrin, aldrin, malathion, Diazinon, BHC and chlordane to evaluate the efficacy of each toxicant in preventing blow fly infestation of the carcass or in controlling established infestations. Dieldrin at 0·25 to 2·0 per cent. strength, endrin at 0·25 to 0·5 per cent, and Diazinon at 0·25 to 0·5 per cent prevented blow fly infestations for 26 to more than 30 days and gave a 98 to 100 per cent reduction of established infestations. Malathion at 0·25 to 0·5 per cent produced 100 per cent kill of the mature larvae on infested carcasses but was less effective than dieldrin, Diazinon, or endrin in preventing blow fly invasion of carcasses. Aldrin was similar to malathion in its overall effectiveness. Chlordane at 1·0 per cent yielded results paralleling those achieved with dieldrin, endrin, aldrin, Diazinon, and malathion at 0·25 to 0·5 per cent levels. BHC was the least effective of the compounds tested.

"The organic phosphorus compounds produced an effective kill of mature blow fly larvae much more rapidly than the chlorinated hydrocarbon insecticides."

Enigk, K. Zur Ökologie der Kriebelmückenlarven. [**The Ecology of *Simulium* Larvae**] *Ztschr. f. Angewandte Zool.* 1955, No. 1, 5–10. [19 refs.]

A brief general account of the conditions under which *Simulium* larvae are found, including a few data of water velocity and oxygen concentration.

Kenneth Mellanby

Lea, A. O., Jr. **Two Items of Equipment useful in Black Fly Larval Control.** *J. Econom. Entom.* 1955, Apr., v. 48, No. 2, 202–3, 2 figs.

First to be described and illustrated is a portable metal canal for volume determinations of small streams in *Simulium* studies in Guatemala. It is 12 inches wide at one end narrowing to 5 inches at the other. The narrow end is blocked by a piece of wood having a U-shaped cut-out 2 inches wide. Graduations marked on the wood had previously been calibrated as flow in gallons per minute.

In the field the water in the stream is channelled into the metal canal and the level rises as it flows through the U opening; direct determination of the flow can be made easily and quickly.

The second illustrated description is of a floating siphon larvicide dispenser, designed to empty a 5 gallon drum of larvicide in 60 minutes. A U-shaped plastic tube is inserted through a large cork and then dropped over a vertical wire secured to the bottom of the drum. This wire passes up into the tubing to keep the siphon upright as the cork floats on the liquid. A lead weight counterbalances the weight of the outer arm of the siphon and the pressure remains constant and the flow of insecticide even.

H. S. Leeson

See also p. 933, Kemper, Experimentalle Untersuchungen über die durch Afterwolle von *Euproctis chrysorrhoea* (Lepidoptera) erzeugte Dermatitis, verglichen mit der Wirkung von Arthropodenstichen. [**Experimental Studies on Dermatitis produced by Bristles of *Euproctis chrysorrhoea*, compared with the Effect of Arthropod Bites**] *Ztschr. f. Angewandte Zool.* 1955, No. 1, 37–59, 4 figs. [16 refs.]

Villiers, A. Note sur quelques Ixodidae et Gamasidae parasites des Vertébrés rencontrés en Afrique Occidentale Française. [**Notes on Ixodidae and Gamasidae Parasitic on Vertebrates in French West Africa**] *Bull. Inst. Français d'Afrique Noire.* 1955, Apr., v. 17, No. 2, 444–54.

Boettger, C. R. & Reichenbach-Klinke, H. H. Gesundheitsstörungen des Menschen durch den Befall mit Taubenzecken (*Argas columbarum* Shaw). [**Health Hazards in Man from Attack by the Pigeon Tick *Argas columbarum***] *Ztschr. f. Angewandte Zool.* 1955, No. 1, 15–21, 2 figs. [15 refs.]

The pigeon tick may sometimes bite man, when a severe and persistent local reaction and mild fever may be produced. *Kenneth Mellanby*

Solomon, M. E. **The Relative Control Values of Different Percentage Mortalities.** *Bull. Entom. Res.* 1955, Apr., v. 46, Pt. 1, 189–91, 1 fig.

The economic significance of individual insect pests surviving fumigation of stored products, depends largely on the rate of increase of the pest, and the time available for an increase to take place.

In the relatively stable physical environment provided by stored products, the chief factors affecting the rate of increase of a pest species (temperature, population density, etc.) can be either ignored or allowed for by calculation.

In such circumstances it is possible to calculate the relative effects on the pest population of various percentage mortality levels in terms of the time required for the survivors from each to produce a population equal to that before the treatment.

Where the rate of increase, x, of a certain species is expotential (so that a population of 1,000 would be $1{,}000x$ after one week), then the time in weeks, t, required for the population to recover from treatment producing 90 per cent. mortality is:—

$$100x^t = 1{,}000$$
$$t = \frac{1}{log_{10}x}$$

In the case of a 99 per cent. mortality, the corresponding value is:—

$$t = \frac{2}{log_{10}x}$$

Thus, irrespective of the rate of increase (so long as it does not change) the recovery time from 99 per cent. mortality is twice that from 90 per cent.; hence the relative values of any given mortalities can be compared, and, if x is known, the absolute recovery times calculated.

A series of mortality percentages so that each has approximately twice the control value of the preceding one in terms of recovery times is 29, 50, 75, 93·75 and 99·6 per cent.

If two successive mortalities are imposed, their total effect can be calculated by multiplying together the percentages surviving in each case.

D. M. Minter

Naidu, M. B. **Physiological Action of Drugs and Insecticides on Insects.** *Bull. Entom. Res.* 1955, Apr., v. 46, Pt. 1, 205–20, 8 figs. [31 refs.]

The author is interested in the method of action of insecticides and has developed a refreshing approach to a subject which he treats as a branch of pharmacology.

He has developed a method of isolating the complete heart of the cockroach which he maintains in a waterbath at 30°C. in oxygenated physiological salt solution. The heart is watched through a microscope and the beats per minute counted. A large number of experiments have been carried out in a uniform way exposing the heart to such drugs as acetylcholine, adrenaline, nicotine, atropine and others which might be supposed to have an effect upon the heartbeat. The author's conclusions, which must be studied in the original, seem to be well founded. He finds that "a mechanism similar in principle to the parasympathetic system of vertebrates is involved in the working of the heart of the cockroach" and that "the nature of the cardiac ganglia of the cockroach is predominantly cholinergic and it appears that a relatively small number of adrenergic ganglia may also be present".

Using the same technique the author then exposes his hearts to a number of well-known insecticides. He finds that "pyrethrum acts both on the ganglia and at the neuro-muscular junction by a release of ACH [acetylcholine] and not by virtue of an anti-cholinesterase action". As to DDT, the action of which has been discussed by others, it causes irregularity of the heart beat with a decline of the frequency, but this effect is not modified by atropine. "It appears that the action of DDT is not due to an anti-cholinesterase property."

P. A. Buxton

Barlow, F. **A Method for removing Insecticide Residues of Wettable Powders from Sprayed Surfaces.** *Bull. World Health Organization.* Geneva. 1955, v. 12, No. 3, 359–64, 1 fig.

There is a need for a method of sampling insecticide residues on sprayed surfaces which will remove any external deposit but will leave behind any insecticide lying in surface depressions and will not remove any of the wall itself together with sorbed insecticides.

The procedure described involved the pressing of pieces of transparent adhesive tape (Sellotape) on to a wall. When removed these pieces bear the deposit of insecticide and very little of the wall.

In the laboratory experiments pieces of glass, unpainted wood and mud bricks were used. The pieces of tape measured 2 in. × 2 in. and 6 pieces were used for each test.

The results show that the method is more informative and reliable than those given by previous methods of sampling; but so far it has been used only in the laboratory—no field trials have been done. *H. S. Leeson*

MISCELLANEOUS PAPERS

Rodhain, J. Histoire de la recherche scientifique médicale et vétérinaire dans les territoires de l'Afrique au Sud du Sahara. [**History of Medical and Veterinary Research in the African Territory South of the Sahara**] *Ann. Soc. Belge de Méd. Trop.* 1954, Oct. 31, v. 34, No. 5, 535–54. [69 refs.]

On the occasion of opening of new premises for the Princess Astrid Institute of Tropical Medicine, Professor Rodhain reviews the history of medical research in Africa since 1894. It falls into 4 periods: 1894–1903; 1904–1914; 1920–1940, and 1944–1954. The first was the time of pioneers in all senses of the term, working largely in missions without the advantage of established laboratories though the period saw the origins of the latter in those instituted at St. Louis in Senegal in 1896, and Léopoldville in the Belgian Congo in 1899. The pioneers are the great names of tropical medicine: Bruce, Koch, Christophers, Dutton and others almost equally well known. They were engaged in both veterinary and medical problems and largely in an effort to clarify the transmission of trypanosomiasis, and the era was closed by Castellani's discovery in 1903 of a trypanosome in the cerebrospinal fluid of a case of sleeping sickness.

The second period was again one of missions engaged principally in the detailed elaboration of the story of human and animal trypanosomiasis, and in the first experiment in its cure and control by drugs and bush clearance. The names of Bruce, Koch, Roubaud recur with those of many other distinguished people, though perhaps one of the most important is underemphasized: Rodhain is modestly mentioned as starting work in 1907.

After the prolonged interruption of the war the third period was characterized by great progress in a therapy of sleeping sickness and malaria, and by the start of work in Africa on yellow fever which culminated in the infection of *Macaccus rhesus* by Mahaffy in 1927, and this led to the unravelling of the story. Though expeditions continued there was a greater tendency to the establishment and enlargement of permanent institutions. The period also saw the climax of the studies on sleeping sickness leading to practicable schemes of control.

The second world war stimulated rapid advance in tropical medical research, and particularly its strong encouragement by governments and the further rapid increase in local centres of work. The mechanisms of the British Colonial Development and Welfare Act, the French *Office de la Recherche Scientifique et Technique d'Outre-Mer*, the Belgian *Institut pour la Recherche Scientifique en Afrique Centrale*, the American Institute of Tropical Medicine in Liberia, and the South African Council for Scientific and Industrial Research, have led to a great provision of research in very wide fields, covering all types of infection and nutritional problems.

The author ends with a tribute to those workers who have given their lives in this progress, placing at the head of them the great figure of Everett Dutton and near to him Stokes [erroneously described as an American] and Noguchi. Beside them he recalls the French worker Moal and the Belgian Henri de Marbaix—whose death came too soon for him to make a scientific reputation, though he was probably the true pioneer in establishing a laboratory in the Congo in 1894. *G. Macdonald*

Ravisse, P. Pathologie comparative des Babinga et de leurs " patrons ". [**Comparative Pathology of the Babinga and their " Patrons "**] *Méd. Trop.* Marseilles. 1955, Jan.–Feb., v. 15, No. 1, 72–83.

This paper discusses at greater length the diseases affecting the Babinga, compared with those of their Congolese " patrons ". [See this *Bulletin*, 1951, v. 48, 504.]

McDonald, D. **Dr. John Fryer—an Early Traveller in the East.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, Mar., v. 49, No. 2, 187–94, 1 fig.

REPORTS AND SURVEYS

Afrique Occidentale Française. Rapport sur le fonctionnement technique de l'Institut Pasteur de l'Afrique Occidentale Française en 1953 [Durieux, C.]. [**Technical Report of the Pasteur Institute in French West Africa in 1953**] 108 pp. [Refs. in footnotes.] 1955. Dakar: Grande Imprimerie Africaine.

As usual, the report of the Pasteur Institute in Dakar contains a great deal of useful and interesting information. More than 10 million doses of biological products were prepared, an increase of nearly half a million over the previous year, and about 4½ million yellow fever inoculations were made. The general laboratory examinations amounted to 46,182. Despite population increase, the indications were that health conditions in Dakar and its environs continued to improve. In particular, there was a continued decrease in the incidence of malaria. A small outbreak of plague was notified in Mauritania early in the year and in March 9 deaths attributed to plague occurred in nomadic tribes near the Spanish territorial border, but these were not confirmed. Immediate control measures prevented the spread of the disease into Senegal.

Dr. Camain presents his usual interesting study on malignant disease and compares the incidence of cancer in the two races in the periods 1942–1949 and 1950–1953, which was very similar. The significance and the localization of the tumours in European and African are discussed at length.

There were 28 treatments for rabies (6 Europeans), with no paralytic accidents, in the Institute: there was one death in an African child of 6

towards the end of treatment. In outstations there were 1,175 treatments (161 Europeans), with no paralytic accidents: two deaths from rabies occurred, in an African man and an African boy, in Upper Volta and Senegal respectively; neither had been treated.

In the section on yellow fever protection tests, it is noted that a negative result was obtained with the serum of a European vaccinated in Paris in 1949 and again in Senegal 3 months before the serum was examined. This is only the second such case known to the authors and was presumably due to anergy. In a small survey connected with the discovery of a case of yellow fever near the border of Portuguese Guinea, mentioned in the 1952 Report [this *Bulletin*, 1954, v. 51, 1012] positive tests were found in inhabitants of the region affected.

Two cases of yellow fever were found in French West Africa in 1953 in Europeans, in an experimental station at Boulel in Senegal. One of them, a man, had received yellow fever vaccine 10 months before, the other (a child of 3) had not been vaccinated. The cases were fully confirmed in the laboratory.

There is a large forest region (Kassas) to the south-east of this station. Small numbers of *Cercopithecus* were found and, in the plantations, some *Erythrocebus* monkeys. They could not be captured, but owing to their relative rarity, it does not seem likely that they played any part in maintaining yellow fever virus in the neighbourhood. However, bush-babies (*Galago senegalensis*) are abundant in the woodland area of Kassas and attention is drawn to the finding of Haddow [this *Bulletin*, 1953, v. 50, 106] in East Africa that these animals were found to be positive in nature more frequently than were monkeys. The few bush-babies that could be kept in captivity by the present authors were negative and attempts are being made to adapt these animals to captivity, so that tests of immunity may be followed up. The finding of *Aëdes simpsoni* as the prevailing species (only one larva of *Aëdes aegypti* was found) suggests that, as was found in Uganda, this mosquito may be the vector of jungle yellow fever in Boulel. There seems little doubt that the 2 cases reported had been transmitted by *Aëdes simpsoni* and the exact rôle of the mosquito in relation to jungle yellow fever in the region is to be studied.

There are interesting figures showing the reduction of yellow fever in French West Africa and in other parts of Africa since 1934, and especially since vaccination by scarification began in the former area in 1939. In the quinquennium 1934–1938, the percentage of yellow fever incidence in French West Africa and Togo in relation to that in Africa as a whole was 35·1. The figures in the periods 1939–1943, 1944–1948, 1949–1953 were 38·6, 9·6, 2·7. In fact, only 5 cases were notified in the French territories in the last quinquennial period. Evidently the extensive vaccination has been highly effective.

Figures for the incidence of urban and rural yellow fever from 1934 show that the former has not been recorded for 10 years; this again underlines the effectiveness of vaccination together with *Aëdes* control. Indeed, since 1944, the disease has been almost entirely of the jungle type.

Drs. Durieux and Koerber publish interesting studies which show that the Dakar vaccine, like the 17D vaccine, results in effective immunity before the 10th day.

There is an account by Boiron and Sénécal of the choice of a method of tuberculin testing. This has been discussed fully in a published paper [*Bulletin of Hygiene*, 1955, v. 30, 214].

There were 26 papers published by members of the staff.

H. J. O'D. Burke-Gaffney

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